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VARIATIONS IN THE RATE OF ECONOMIC GROWTH IN THE U.S.A., 1869–1939

By BERNARD WEBER *and* S. J. HANDFIELD-JONES[1]

1. THE object of this paper is to examine the changing rate at which the American economy has grown and expanded in a period of approximately 70 years, to offer some observations on the movement of real wages, and to point to some of the forces which help to account for both.

Our primary interest is the long fluctuations in secular growth as evident in various series of real income and output. We are not concerned with the familiar fluctuations in prices and interest rates although we recognize their relationship to the process of economic growth. No more are we concerned with the short-period business cycle, for we wish to concentrate on the progressing performance of factors in use and not on the varying degrees to which existing factors are employed, degrees which tend to average out in the longer run. Both these classes of fluctuation have received a good deal of attention from economists and economic historians, but the movements referred to have until recently been relatively neglected. Yet they can equally claim to be a characteristic feature of economic growth.

Apart from its intrinsic interest, the study of the uneven course of progress in the U.S.A. is useful for comparison with some recent work of a similar nature relating to the United Kingdom. In particular, two recent papers have explored the check to real wages and real income a head[2] which occurred in the British economy some time in the 1890's and lasted until 1914. It was shown that the check to real wages can to some extent be explained by a distributive change,[3] but that the major cause of the check to both, real wages and real income a head, must be sought in a check to productivity, statistical evidence for which was supplied.[4]

A comparison with the U.S. data in the period 1890–1914 is of interest therefore if only to establish whether and to what extent the check to productivity which occurred in the United Kingdom and probably also in

[1] We are greatly indebted to Professor E. H. Phelps Brown for encouragement and valuable comment, while at the London School of Economics, where most of the statistical work embodied in this paper was carried out, and thereafter. Thanks are also due to Professor S. Kuznets for reading the manuscript and supplying comment.

[2] Real income is expressed per head of the gainfully occupied population throughout this paper.

[3] E. H. Phelps Brown and P. Hart, 'The Share of Wages in National Income', *Economic Journal*, vol. lxii, June 1952, p. 253.

[4] E. H. Phelps Brown and S. J. Handfield-Jones, 'The Climacteric of the 1890's: A Study in the Expanding Economy', *Oxford Economic Papers* (N.S.), vol. iv, No. 3, Oct. 1952, p. 266.

other countries of western Europe[1] had a counterpart in the U.S.A. It is only by the use of the comparative method that we may hope to establish whether or not such phenomena as the 'climacteric' in the United Kingdom and the causes giving rise to it are peculiar to that country alone or are of more general significance. No less interesting than the comparison of movements of real income a head and productivity is the comparison of the course of real wages relative to other incomes.

Methods, sources, and statistics are combined in an Appendix.

2. Except for the downswings associated with the trade cycle, there is no check, in the sense of actual decline (or failure to advance), to the growth of real income a head in the U.S.A. until the 1930's, but there are significant variations in the rate of secular growth.

These variations are strongly evident in S. Kuznets's estimates of real national product. The estimates are given in the form of averages calculated for decades[2] and the fluctuations cannot therefore be ascribed to the peculiarities of individual business cycles. Percentage changes from decade to overlapping decade show that three periods of relatively faster growth can be distinguished: the decades covered under 1874–83 and 1879–88; 1894–1903 and 1899–1908; and finally 1914–23 and 1919–28. In the intervening periods, it appears, economic progress as measured by real income a head, could advance only at a slower rate. S. Kuznets himself noted such long swings in the rates of growth of national income (measured net or gross), some of its components, population and income *per capita*, with population lagging fairly consistently behind. He located the peaks in approximately the late 1870's, the early 1900's, and the mid-1920's, and the troughs in the early 1890's, about 1910–12, and the mid-1930's. The duration of these swings is thus just over 20 years, a period considerably shorter than that of Schumpeter's Kondratievs, and much longer than his Juglars.[3]

[1] A check to real wages appears to have occurred in the 1890's also in Germany, France, and Belgium (E. H. Phelps Brown and S. V. Hopkins, 'The Course of Wage Rates in Five Countries, 1860–1939', *Oxford Economic Papers* (N.S.), vol. ii, June 1950, p. 226, and E. H. Phelps Brown and S. J. Handfield-Jones, op. cit., pp. 266–8). Real income a head data before 1914 are fragmentary for Belgium and France, but for Germany annual data are available and they show a check similar to that to real wages.

[2] S. Kuznets, *National Product since 1869*, N.B.E.R., 1946, p. 118.

[3] S. Kuznets's series of national product may be compared with R. F. Martin's alternative series of 'realised national income' (R. F. Martin, *National Income in the U.S., 1799–1938*, N.I.C.B., 1939, pp. 6–7). The latter is available in 10-year intervals from 1799 and in annual form from 1899, but we have extended its annual coverage to 1889 by using annual estimates of the value of output of finished commodities (W. H. Shaw, *Value of Commodity Output since 1869*, N.B.E.R., 1947, p. 76) as a basis for interpolation. The resulting series was deflated by a general product price index (E. H. Phelps Brown and S. Hopkins, op. cit., pp. 277 and 282) and expressed per head of the total occupied population. Martin's estimates are based on the flow of income payments throughout, while Kuznets's estimates make use of the same approach only after 1919. Prior to that they are based on commodity flow data supplemented by estimates for services, which were obtained from sample budget studies.

The rates of change in real income a head as well as in real wages[1] are set out in Table I, and Fig. 1 illustrates the movement of real income a head as expressed by percentage deviations from its linear trend.

3. There are a number of factors on which the growth of real income a head depends: efficiency in production; changes in the relative importance of sectors of different efficiency; income from abroad and changes in the terms of trade.

TABLE I

U.S.A.: Rates of Increase in Real Income a Head and Real Wages from Decade to Overlapping Decade, 1869–1938. Cols. (1) and (2) in 1929 prices

	(1) *S. Kuznets's net national product* (*Bill* $)	(2) *Col. (1) per head of the gainfully occupied population* ($)	(3) *Rates of change in col. (2)* (%)	(4) *Rates of change in real wages* (%)
1869–78	9·3	642	..	..
1874–83	13·6	813	+26·7*	+2·0
1879–88	17·9	920	+13·1	+9·5
1884–93	21·0	936	+1·8	+4·7
1889–98	24·2	955	+2·0	−0·7
1894–1903	29·8	1,056	+10·6	+1·9
1899–1908	37·3	1,167	+10·4	+3·5
1904–13	45·0	1,246	+6·8	+2·9
1909–18	50·6	1,293	+3·8	+1·2
1914–23	57·3	1,375	+6·4	+8·8
1919–28	69·0	1,545	+12·3	+13·1
1924–33	73·3	1,531	−0·9	+7·5
1929–38	72·0	1,440	−5·9	+9·3

* The extremely high rate of change is in part due to an understatement in the 1869 Census of Manufactures. S. Kuznets estimates that a maximum upward adjustment of 5 per cent. for 1869–78 and successively less for subsequent decades is called for (*National Product since 1869*, p. 61). This would, however, only slightly affect the rate of change in 1874–83 which appears excessive.

Income from abroad and foreign trade contribute only a small proportion to national income in the U.S., and even large changes in these factors

The two estimates can therefore be regarded as largely independent and are valuable checks on each other.

There are important divergences in the results, especially in the earlier years, and the trend of Kuznets's series is steeper throughout, but we are mainly concerned with the alternation between periods of faster and slower growth in real income a head, and these are apparent in both estimates during the period from 1889 to 1938, when Martin's estimates are available in annual form, though to a lesser extent in Martin. Only in 1909–18 and 1914–23 does the rate of increase change in opposite directions in the two series.

[1] Real wages are discussed in section 10.

are unlikely to affect the course of national income in a substantial way. We have therefore not attempted to make the statistical adjustments which would illustrate the course of national income under the assumption of unchanging terms of trade and in the absence of income from abroad.[1]

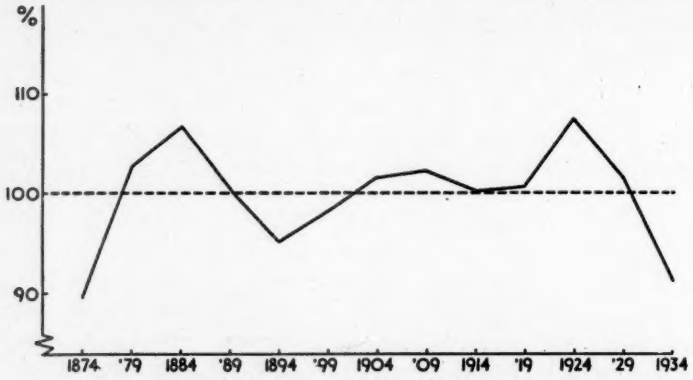


FIG. 1. U.S.A.: Net National Product (1929 prices) per Head of the Occupied Population, 1874–1934. Per cent. deviations from linear trend.

The effect of changes in the relative importance of sectors with different outputs a head is of much greater consequence, particularly in economies undergoing rapid transformation. If, for instance, in the course of industrialization, there is a transfer of resources from agriculture to manufacturing and if output a head in the latter is greater than in the former, the real income of the community may be considerably increased without any changes in productivity in either sector.

We have estimated the effect of such changes in the U.S.A. in 1870–1930 by taking into account the changing distribution of the labour force and by assuming that output a head in each of the major sectors of the economy, such as Agriculture; Manufacturing; Trade, &c., remained throughout as it stood in 1900. The result of the calculation suggests that in the absence of changes in productivity there would have been an overall rise of approximately 30 per cent. in real income a head by 1930, a rise which is in large part to be accounted for by a relative shift away from agriculture towards manufacturing, trade, and the services.

Decennial percentage increases in real income a head arising from inter-sector shifts (as distinct from increases due to the advance of productivity in each sector) do not, with the possible exception of the period 1910–30,

[1] E. H. Phelps Brown and S. J. Handfield-Jones, op. cit., pp. 269–70, have carried out these calculations for the United Kingdom, where both income from abroad and terms of trade were of greater importance, and have found that they did not materially change the trend of real national income.

suggest a relationship with the fluctuations in secular growth noted in section 2. For figures see Table II. The low entry in 1880 is largely explained by the absence in the 1870's of a shift away from agriculture.[1]

TABLE II

*U.S.A.: Increase in Real Income per Head of the Gainfully Occupied Population due to Inter-sector Shifts**

	1870	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*
	%	%	%	%	%	%	%
Base: 1870 . .	..	0·9	7·5	12·2	17·8	21·8	29·9
Base: Preceding decades	..	0·9	6·5	4·4	5·0	3·4	6·6

* Sources and method in Appendix.

4. Having noted inter-sector shifts we must now turn to what is the most important element in the growth of real income a head, namely productivity itself.

We have examined the course of productivity in the following sectors of the United States economy: Agriculture; Construction; Manufacturing; Mining, and Transport and Communications. For the period from 1870 to the First World War we have calculated our own productivity indexes by making use of physical output data and Census estimates of persons gainfully occupied in the respective sectors. From 1900 onwards various other productivity indexes become available[2] and these have been used to indicate the course of output a head in the period 1917–39, as well as to check our results in years before 1917. Comparison with our own work shows, on the whole, good agreement, but cannot in every case be expected to be too close in view of variations in coverage of both the output and input indicators. Our indexes, for instance, are calculated per head of persons occupied (and include therefore employed and unemployed), while some of the other indexes are corrected for unemployment. Productivity indexes which allow for unemployment are more satisfactory for some purposes, but we are here concerned with trend and may assume that the latter is not significantly affected by cyclical changes in employment.

Figs. 2 and 3 and Table III illustrate the 'productivity history' of the five sectors. Construction apart, each sector shows remarkable progress. The frequent ups and downs are those of the trade cycle and need not concern us here, but there are also longer variations in the rates of growth which are of interest and must be examined.

[1] The percentage of persons occupied in agriculture, forestry, and the fisheries was 50·2 per cent. in 1870 and 50·0 per cent. in 1880. By 1890 it had fallen to 42·8 per cent.

[2] Those published in some of the works undertaken under the auspices of the National Bureau of Economic Research were particularly useful.

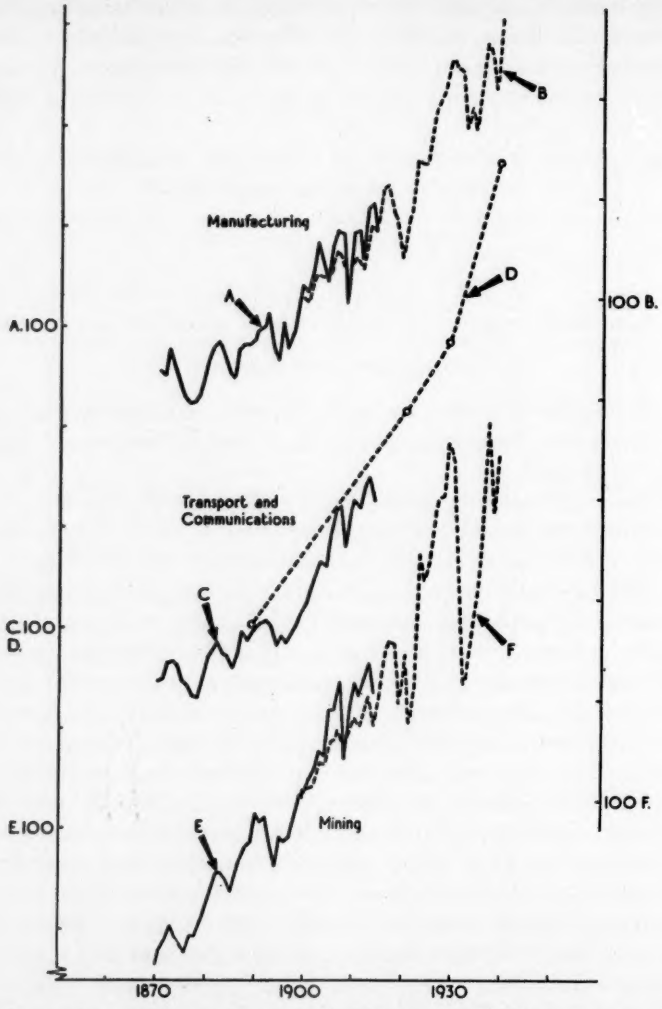


FIG. 2. U.S.A.: Indexes of Output per Head in some Sectors of the Economy, 1870–1939. A, C, E: 1890–9 = 100; B, F: 1899 = 100; D: 1889 = 100. One vertical division = 40 points.

Three periods of faster growth alternating with three periods of deceleration, similar to those found by Kuznets in his national product data, can be distinguished, but the actual turning-points can be identified only approximately. Rather than locating them from changes in the slope of 9-year moving averages, as was done by Kuznets, we have preferred to

select for turning-points peaks or troughs of the trade cycle nearest to significant changes in trend. If 1870, the first year covered by our indexes, can be assumed to mark the trough of the first period of faster growth, and

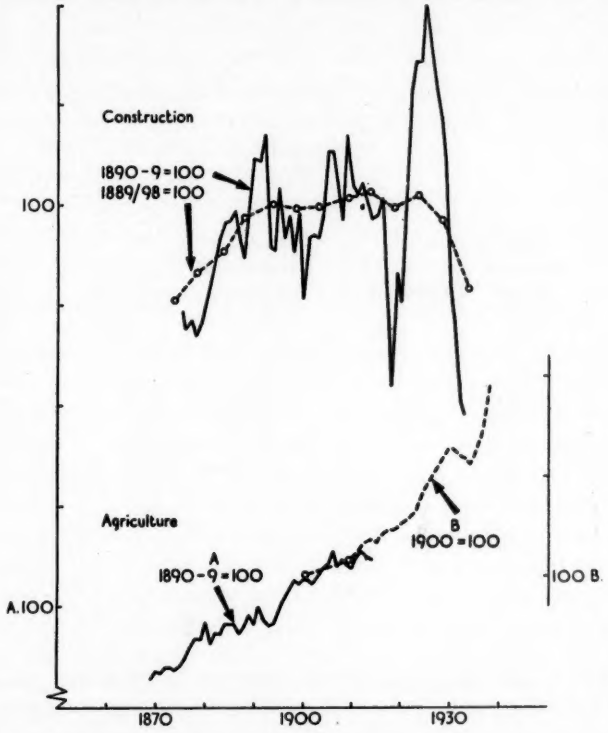


FIG. 3. U.S.A.: Indexes of Output per Head in Agriculture and Construction, 1870–1939. One vertical division = 40 points.

1938 the trough of the last period of slower growth, we can trace three complete swings, similar in timing and duration to those found in Kuznets's national product data, as follows:

	Upswing		*Downswing*		
	Trough		*Peak*		*Trough*
I	1870	(late 1870's)	1882	(early 1890's)	1894
II	1894	(early 1900's)	1907	(1910–12)	1919
III	1919	(mid 1920's)	1929	(mid-1930's)	1938

The figures in brackets are Kuznets's dates on which the swings in national product are centred.

The two later swings are strongly evident in the Manufacturing,[1] Mining, and Transport and Communications sectors (Fig. 2 and Table III). One qualification only is required. Output a head estimates for transport are available after 1914 for a few odd years only and cannot be

TABLE III

Rate of Growth in Real Income per Head of the Gainfully Occupied Population and in Output a Head in Four Sectors of the United States Economy, 1869–1938

	(1) *Real income per head of the gainfully occupied population* (%)	(2) *Manufacturing. Output a head* (%)		(3) *Transport and communications. Output a head* (%)	(4) *Mining. Output a head* (%)		(5) *Agriculture. Output a head* (%)	
1869–78	..	..		..	..		..	
1874–83	+26·7	+ 3·5		+4·0	+18·6		+9·6	
1879–88	+13·1	+9·8		+8·4	+21·8		+6·9	
1884–93	+1·8	+5·3		+7·1	+16·0		+3·6	
1889–98	+2·0	+5·1		+2·8	+6·5		+5·3	
1894–1903	+10·6	+12·7		+7·5	+11·1		+7·6	
1899–1908	+10·4	+13·8		+12·3	+21·5		+7·4	
1904–13	+6·8	+6·9	+6·7	+14·5	+13·9	+12·1	+4·2	
1908–18	+3·8		+9·9	..		+11·5		
1914–23	+6·4		+7·6	..		+6·3		+5·6
1919–28	+12·3		+14·0	..		+19·4		+9·7
1924–33	−0·9		+14·8	..		+9·6		+10·2
1929–38	−5·9		−3·6	..		+0·7		+6·3

analysed in comparable form, but the estimates for individual years point to a cumulative rise throughout the period between the two wars. This trend may or may not be confirmed by an annual series, but it is certain that a most important element in this sector is the growth of efficiency due to fuller utilization of systems and the growing length of haul.

The first swing is less obvious in Fig. 2 but emerges clearly in Table III.

A similar pattern can be traced in Agriculture, although the upward lift after 1894 is broken during 1898–1902, and in the 1930's the sector diverges from Manufacturing and Mining by continuing the progress of the 1920's, although at not quite so fast a rate.

Productivity in Construction follows a pattern of its own. It is dominated by the 'Building Cycle', a type of fluctuation similar in duration, though not, except for the inter-war years and the immediate pre-1917 period, in chronological timing. It is a fluctuation which is best separately

[1] In Manufacturing the upswing after 1894 seems to have reversed some time between 1900 and 1905, rather earlier than in the other two sectors.

analysed in terms of supply and demand for houseroom and more specifically in terms of population growth and migration.

The outcome of our productivity analysis must now be related to the movement of real income a head. Table III gives, in a comparable form, the rates of growth of productivity in four sectors and of real income a head. Fluctuations in the latter are closely confirmed by similar fluctuations in the former, a confirmation which is highly encouraging in view of the independence of the two sets of data. A pattern of growth characterized by alternating periods of faster and slower growth seems to be firmly established for a large section of the economy. However, it must be remembered that not all sectors studied display this pattern (i.e. Construction) and that some sectors are not included in our analysis (i.e. Trade, Services, &c.). Nevertheless the fluctuations in the four sectors are large and powerful enough to account for the pattern of the similar fluctuations in real income a head.

5. Changes in productivity can be further examined by calculating indexes of output a head in a number of industries for which data of both output and manpower are available. Such indexes are not, in each case, as reliable as those calculated for the aggregate sectors of the economy, largely on account of difficulties encountered in estimating, in consistent and comparable form, the number of persons occupied. Sufficiently detailed breakdowns of statistics are not always available in the Censuses of Population, particularly in earlier years, and there were occasional undercounts as well as numerous changes in classification, coverage, &c. However, the errors involved in the indexes presented are hardly so great as to render suspect marked movements in trend. So as to illustrate changes in the trend of productivity in some other industries, which could not be explored with our method, we have made use of indexes calculated by S. Fabricant from Census of Manufactures materials.[1] The disadvantage of Fabricant's data, for our purposes, is that they are available only for a few odd years in this period.

Our indexes do not extend to years later than 1914 and we have not attempted to survey the trends for the 1870's and 1880's in view of the paucity and possible unreliability of the data.[2] But our analysis of the period 1890–1914 brings out a few points of interest.

A most striking fact to emerge is the fast advance of the iron and steel complex of industries, an advance which must largely be accounted for by such innovations as the opening of the Mesabi range; the supersession of the Bessemer method by the open-hearth process, with its advantages in permitting the use of a wider range of raw materials, including scrap; the increasing size of furnaces, and technical integration and mergers.

[1] See Appendix. [2] The indexes are given in the Appendix as far back as available.

But the trend of output a head advanced, if at a slower pace, in most industries (examined) during the 1890's and until 1900–5, thus confirming the upswing in the aggregate manufacturing sector. The slowing down in the rate of growth after the turning-point is similarly confirmed by some

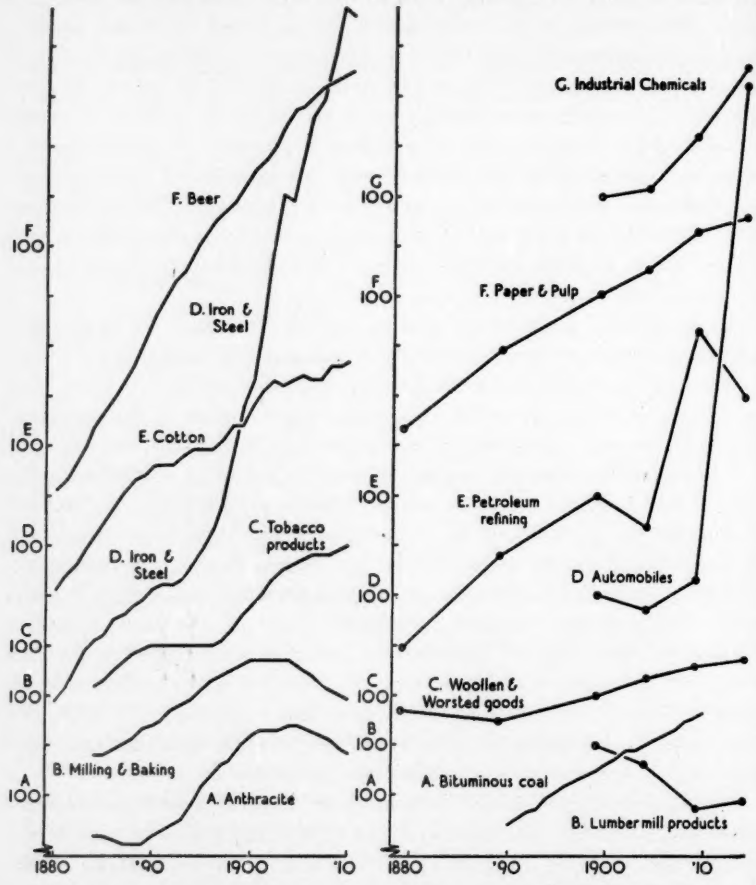


FIG. 4. U.S.A. Indexes of Output per Head in some Industries, 1879–1914.

9-year moving averages.
1890–9 = 100.
One vertical division = 10 points.

1899 = 100.
A: 9-year moving average 1890–9 = 100.
One vertical division = 20 points.

individual industries, but the pattern is considerably more varied. If general advance was the keynote before 1900–5, each industry went its own way thereafter.

A selection of the industries examined is graphed in Fig. 4.

It would be folly to lay undue stress on generalizations derived from the amount and nature of the data assembled here, but three tendencies of a general validity suggest themselves. First, the similarity of the movement of output a head before 1900–5, already referred to; the subsequent

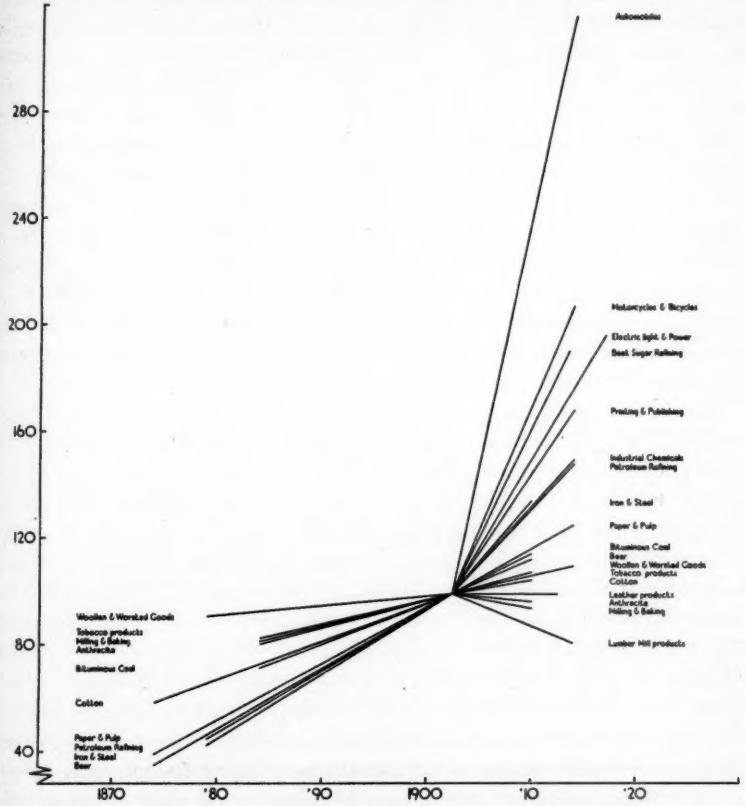


FIG. 5. U.S.A.: Indexes of Output per Person Occupied or Employed in some Industries, 1874–1917.
9-year moving averages except Fabricant indexes and index for Electric Light and Power. 1900–4 = 100; Fabricant indexes 1899–1904 = 100; Electric Light and Power 1902 = 100.

'splaying out', with some industries continuing their advance while others decelerated or suffered decline; and finally the divergent history of 'old' and 'new' industries after 1900–5.

These points are best illustrated by means of a diagram. In Fig. 5 output a head indexes are represented by two sets of lines, the first connecting the beginning of the various indexes with the base period, taken to centre

on 1899–1904; and the second connecting the base with the last years for which output a head was available. The 'splaying out' is forcibly brought out, and it is equally evident that the industries which drive upwards after 1900 are the 'new' industries such as automobiles, motor cycles, electricity, industrial chemicals, &c., while the old industries slacken or at the best continue as before. But it is the traditional industries which dominate the pattern of development for they are fully grown; the newer industries and techniques, rich in promise for the future, were in this period of only limited application and importance. But their fast advance at a time when other industries, associated with older techniques, were decelerating is of interest for the light it sheds on the process of economic growth itself.

6. The purpose of this section is to explore the relationship between capital accumulation, innovation, and the fluctuations in the growth of real income a head, noted in sections 2, 4, and 5. For that we rely largely on the capital coefficient or ratio of the stock of capital to the flow of income, each measured in real terms. Before, however, presenting our findings a brief discussion of the sources used in the calculation of the U.S. capital coefficient is essential.

The capital stocks used are based on S. Kuznets's estimates of 'Reproducible Wealth other than Household',[1] given at approximately 10-year intervals during 1879–1939. Two sets of estimates are available: one based on the 1922 Census of Wealth which evaluates the wealth of the U.S.A. in Census years back to 1880; and the other which is based on the 1880 Census total to which is cumulated (and decumulated) the flow of net capital formation. There are considerable divergences between the two sets of estimates which are only in part due to differences in coverage, and the Census estimates must be regarded as highly suspect in view of the methods of valuation employed in the early censuses. The original figures are, in fact, hybrid valuations between current market values and original cost, the latter either depreciated or undepreciated. Even where the exact method of valuation could be established, considerable difficulties in calculating appropriate price indexes for adjustment to constant prices had to be faced. The maximum error is thought to be probably as high as 20 per cent. We have therefore mainly relied on the estimates obtained by cumulating net capital formation. These appear to be considerably more reliable and have the further advantage of being available in annual form from 1919.

The one major advantage of the Census of Wealth estimates is that they are available by industrial component and it is therefore possible to use them for the calculation of capital coefficients which exclude houses. This is desirable since houses form a large part of total capital stock and their

[1] S. Kuznets, *National Product since 1869*, N.B.E.R., 1946, pp. 228–32.

contribution to national productivity is remote and indirect. To check the importance of this factor we have calculated capital coefficients, including and excluding residential buildings respectively, but have found little difference in trend.

Through 1894–1939 the long-run trend of the capital coefficient, based

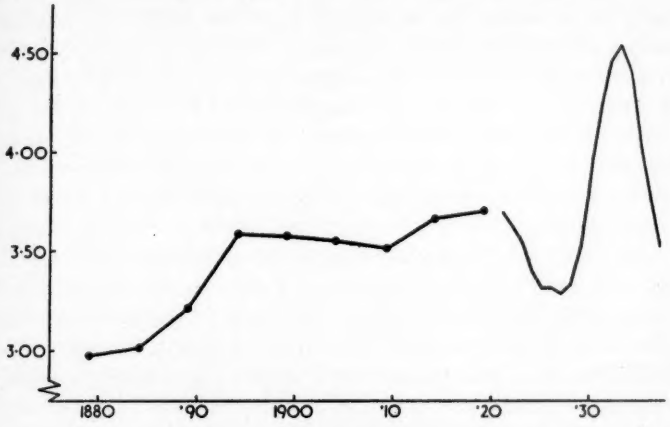


FIG. 6. U.S.A.: Capital Coefficient (ratio of capital stock to flow of income), 1879–1939.
5-year moving averages in 1921–37.

on capital formation data, is best summarized as horizontal,[1] but if the lower values in 1879, 1884, and 1889 are included it could equally be regarded as moderately rising (Fig. 6). Interpreted in less formal terms, a stable capital coefficient implies constant returns per unit of physical capital while a rising coefficient would mean diminishing returns. A tendency to diminishing returns is likely to set in at some stage as a result of successive applications of capital, of a given type, per unit of labour. On the other hand, such a tendency will be counteracted by improvements and innovations, and these appear to have been powerful enough to maintain in the long run a stable capital coefficient in both the United Kingdom and the U.S.A.

We do not intend to place much emphasis on the trend of the coefficient

[1] Some confirmation for this result is available in the annual series calculated by R. W. Goldsmith for 1897–1950 ('The Growth of Reproducible Wealth of the U.S.A. from 1805 to 1950', *Income and Wealth of the U.S.*, ed. S. Kuznets, International Association for Research in Income and Wealth, Income and Wealth Series, ii, 1952, p. 297). Goldsmith's estimates are derived by cumulation of depreciated past capital expenditures and are estimated by Goldsmith to be subject to errors of not less than 10 per cent. and probably as high as 20 per cent. No prominent long-run trend is evident in either of his two series, one based on total capital and the other on structures and producers' equipment only.

over the whole time range of the series. Its movements in the shorter run are no less significant, and we look to them for illumination on the changes in the rate of progress. A single generalization describes these short-run trends: the capital coefficient rose in the periods of slow growth in real income a head, and it fell in the periods of more rapid growth. In the 1930's the unusually heavy depression strongly affected the trend so that it is difficult to verify this correlation, but it is clearly the case in the 1920's when the coefficient fell quite sharply and real income a head made rapid strides. Prior to 1919, the capital coefficient is only available at 5-year intervals, and the years for which it could be calculated do not in each case tally with the turning-points in the swings in real income; furthermore, the estimates for mid-decade years (1884, 1894, &c.) are less reliable than those relating to the last year in each decade.[1] However, in 1884–94, a period of slower growth in real income a head, the coefficient rose; in 1894 to 1909 the coefficient fell while real income a head advanced rapidly; and in 1909–19, another period of slower growth, the coefficient rose once more. The movements are well defined except perhaps for the fall after 1894 which is so small as to be well within the margin of error. On the other hand, the break in trend in 1894 is very strongly marked and the coefficient for that year is almost certainly too low.[1] Moreover, pronounced movements in trend are likely to be exceptional since both annual investment and the annual increment in the growth of income form only a small proportion of total capital stock and total annual real income. Confirmation for our results is again found in Goldsmith's data, which show a moderately falling trend between 1897 and 1906, and one that is rising in 1907–14.[2]

This relationship between the course of the capital coefficient and changes in the rate of growth of economic progress measured by real income a head is not unique to the economy of the U.S.A. In a recent paper relating to the U.K.[3] three phases in the movement of the capital coefficient were distinguished, and these phases correspond to periods of more and less rapid economic progress. In 1880–95 real income grew faster than capital stock and the capital coefficient fell; from 1895 to 1913 real income hardly rose at all while capital rose by much the same extent as before and thus the coefficient increased; and finally the coefficient fell again in 1924–38, when real income again rose substantially faster than the stock of capital. Rarely does one find a relation occurring as unexceptionally as this in the records of complex and dynamic economies.

[1] See Appendix, p. 130.

[2] Goldsmith's coefficient falls from 3·59 in 1897 to 3·15 in 1906 and rises to a pre-war peak of 3·84 in 1914.

[3] E. H. Phelps Brown and B. Weber, 'Accumulation, Productivity and Distribution in the British Economy, 1870–1938', *Economic Journal*, vol. lxiii, June 1953, p. 263.

The capital coefficient is, of course, the inverse of the average productivity of capital, measured over the whole range of the economy, to which the concept of real income a head, or the average productivity of the labour force, is symmetrical. It follows that the movement of each can be predicted if any specific production function for the economy as a whole is specified. The simplest case is a function unchanged through time by changes in technique or other innovations. An increase in the stock of capital available to a given labour force will then result in an increase in output and thus an increase in output per head; but the increase in output will be less than proportional to the increase in the stock of capital, so the capital coefficient will rise. If accumulation was proceeding more rapidly than usual in certain periods of time, real income per head would rise more rapidly and so would the capital coefficient. Since the coefficient is observed to fall in periods of rapid growth of real income a head, the varying rates of economic progress cannot be explained by varying rates of accumulation.

In some periods, such as 1884–94 and 1909–19, when the capital coefficient rose while real income a head also increased, if relatively slowly, this simple model of accumulation is not unreasonable. But the observed developments in the other periods for which the coefficient has been calculated, and the consequent stability of the coefficient over the whole span of years, can only be explained by processes of innovation, so transforming production functions that the tendency towards diminishing returns was halted or reversed.

Innovation in this context must be conceived in the broad Schumpeterian sense. It includes not only technical changes in production processes and equipment but also the discovery of new resources, the development of new types of organization, and new methods of management. And the links between innovations, accumulation, and progress are therefore tenuous. Rapid progress may be experienced due to innovation when the capital stock is increasing no faster than the labour force, as in the United Kingdom between 1924 and 1938;[1] innovation and progress may occur and yet not affect the capital equipment used; and what is more important, a good deal of innovation can be carried into effect in the course of capital replacement out of depreciation funds. On the other hand, periods of rapid expansion in the growth of real income a head are normally periods of accelerated capital formation, implying that innovation generally stimulates an increase in the proportion of capital to labour. If accumulation rather than innovation appeared to be the primary determinant of the expansion in progress, a complex analysis of the demand and supply of

[1] The reference relates to capital stock excluding buildings. See E. H. Phelps Brown and B. Weber, op. cit., Fig. 4, p. 269.

capital would be required; but since the capital coefficient tends to fall rather than rise at such times, the emphasis must be placed on innovation.

The evidence arising from our capital coefficient analysis requires, however, cautious handling and is not of a kind which permits emphatic conclusions until more refined methods and statistics are available for verification. Quite apart from the difficulties relating to the adequacy and reliability of the statistical materials, there are difficulties of a conceptual kind which must be kept in mind.

The growth of real income is a function not only of accumulation and capital-requiring innovations but also of such factors as the structure and organization of the labour force, management, &c. Changes in any of these may be reflected in the capital coefficient irrespective of what happens to capital stock. Hence the validity of the capital coefficient as a tool of analysis of the kind employed here depends in part on the relative role capital *cum* innovation plays in economic progress.

It may be objected that variations in the rate of growth of real income a head may arise as much from the varying degree to which the capital stock is utilized as from new capital. In other words, a falling capital coefficient may be due not to innovation but to greater utilization of existing capacity and a rising coefficient may merely reflect greater waste of resources. However, fluctuations in the use of capacity are largely a phenomenon associated with the trade cycle and need not concern us here since they tend to average out in the longer run. Nor would a persistent trend towards increasing excess capacity, even if established, seriously affect the argument. Only variations in the use of capacity similar to the swings in economic progress noted might affect our results, and we know of no evidence to postulate such movements.

Capital coefficients may therefore, we maintain, usefully be employed to illuminate some of the key relationships in economic progress, as indeed the empirical findings confirm. They might prove even more profitable if they were to be based not on aggregate capital stocks and outputs but on stocks in individual industries and sectors of the economy.[1] In addition average coefficients might with advantage be supplemented by marginal coefficients,[2] and some technical measures of capital efficiency might prove illuminating.

7. It is natural to think first of the processes of innovation as an aggregate of many unrelated inventions and improvements, each by itself

[1] Capital coefficients (gross) for industries were calculated by W. Leontief (*Studies in the Structure of the American Economy*, 1953, p. 220). They relate to 1939 only and exhibit considerable variations between industries, ranging from 7·1 in housing to 0·07 in the clothing industry.

[2] This was done by R. W. Goldsmith, op. cit., p. 297, but the results proved unilluminating.

insignificant but of importance *en masse*. While such gradual continuous improvement is always occurring, the pattern of technical progress as a whole appears to have been dominated not so much by this kind of gradual advance as by discontinuous and massive innovation. There are at any time a small number of basic factors which are technically fundamental to large groups of industries or indeed to the whole area of productive activity. Such factors include the source of power or the type of prime mover, the methods of transportation, the property of materials, and such fundamental techniques as the interchangeability of parts, automatic control systems, and high-temperature technology. One or two inventions and discoveries of this kind can transform the common technical foundation in a large sector of the economy and may revolutionize production functions all round. Steam combined with steel produced a second industrial revolution of this character, and electricity, the internal combustion engine, and industrial chemistry brought about a third. And perhaps a fourth is now in preparation.

It is to discontinuities in such basic innovations that we look for an explanation of the uneven rate of progress in the U.S.A. Periods of rapid advance are periods of widespread application of new methods and materials in many fields, infinitely complicated by chains of consequential innovation and the possibilities of each benefiting from the changes occurring everywhere else. As the new possibilities are gradually losing scope the pace will slacken; compared with the substitution of a steel steamship for several sailing-ships, the addition of further steamships to the transformed fleet cannot be expected to make much difference, even though they may be of improved design. During these ensuing periods of relative technological stability, preparations for the next advance will likely be under way. But the delay between invention and massive innovation may be prolonged, and a good deal of expenditure may have to be incurred with little or no immediate return. Funds must be found for the costs of research, for early and perhaps unsuccessful experiment, for pilot plants, and finally heavy investment may be required to make the new product generally available.[1] At the same time, alternative claims for resources for a host of other purposes, such as war and rearmament drives, unproductive capital exports, building booms, or gold-rushes, may delay or interrupt the application of technical invention[2] and may thus slow down the pace of economic advance.

[1] A special case of this kind is found in the railway due to the indivisibility factor. The whole system must be constructed, in itself a lengthy process, and even then some time may elapse before the full effect on productivity emerges.

[2] For an exposition, as regards the U.K., of the thesis that investment alternated between productive and unproductive (or relatively more and less productive) outlays, see W. W. Rostow, *British Economy in the 19th Century*, 1948, ch. 1.

8. We may now briefly indicate some of the major specific innovations which are associated with the upswings in the rate of growth of economic progress in the U.S.A. The innovations mentioned cannot, of course, pretend to be comprehensive, but may serve as a tentative indication of the nature of the changes involved.

Thus the expansion of the 1870's may be associated primarily with steam power. It was in the 1870's that steam became more important than water as a source of power in manufacturing, measured by both the number of units in which it was employed and by the total power generated. Even more important was the opening of the interior and the development of new resources which was made possible by the application of steam to transport. The trend of railway building was sharply upward from the mid-1860's to the all-time peak in the mid-1880's.[1] Thereafter it reversed, and although it continued at a high level through 1885–1917, the most productive lines as regards effect on real national income were completed in the earlier period. What remained was more in the nature of supplement and extension rather than breaking new ground.

By the early 1880's the most productive lines were completed and the post civil-war spurt was losing scope. Further extension could not produce the same effect and the rate of advance could not be maintained. Were it not for the invigorating stimulus of the railways on a country rich in undeveloped resources, a stimulus perhaps not as potent in the 1880's as it was in the 1870's but nevertheless powerful, the setback to the rate of growth might have been even greater.

Similarly, the expansion of 1894–1907 may be ascribed to a large extent to innovation by way of discovery and development of new resources and to the widespread exploitation of the innovations made possible by steam in combination with steel. Steel in the form of machinery, rails, ships, and buildings was indeed the fabric of expansion. Output of steel ingots and castings rose from 4·4 million tons in 1894 to 23·4 million tons in 1907;[2] even so, its contribution to national productivity is enormously understated and cannot, of course, be measured directly by output or productivity in the steel industry, no more than the effect of railway development can be summarized by mileage of lines laid or by some measure of efficiency of freights or passengers carried. The magnitude of the contribution of these innovations must be estimated in terms of the consequences, immediate and remote, of their massive application throughout the economy.

[1] *Historical Statistics of the U.S., 1789–1945*, U.S. Department of Commerce, p. 200. This is the period of transcontinental railway building, for so long delayed by Southern hostility and the Civil War, the first line to cross the continent (Union Pacific) being completed in 1869.

[2] Output in 1908–15 averaged 25·4 million tons, or if the sharp rise to 42·8 million tons in 1916 is included, 27·3 million tons. *Historical Statistics of the U.S., 1789–1945*, p. 187.

Closely connected with the progress in the iron and steel industry were developments in mining, where perhaps the most important individual development was the opening up on a large scale of the Mesabi range from which came the rich and abundant ore used in the manufacture of iron and steel. The exploration of oil became important and new sources of base metals were exploited. If advance in this sector was due in large part to a better transport system and to developments elsewhere, its importance in its own right as a class of innovation particularly significant in the economic progress of the U.S.A. is unchallengeable.

By 1907, however, the major force of these basic innovations appears to have spent itself. Opportunities for further massive extension were gradually being exhausted and once again the economy could progress only at a slower rate of growth. Retardation was, however, not universal. New techniques were being developed and new industries forged ahead and if, as yet, relatively insignificant in their effect on the economy as a whole, they were nevertheless a pointer to the future.

Finally, the fast advance of the 1920's can be linked to the maturing of 'new' industries and techniques—such as electricity, the internal combustion engine, ferrous alloys, industrial chemicals, &c.

9. That the swings in the rate of growth of real income are a real phenomenon and not a statistical illusion we take to be reasonably established. Kuznets's national product data, based largely on commodity flows, are confirmed, as regards secular undulation, by Martin's estimates which are based on the flow of income payments, and they are further confirmed by our productivity indexes derived from physical outputs. Similar evidence is at hand for the United Kingdom. But granted that we accept the statistical findings, there still remains the problem of determining whether the fluctuations discussed form part of a long-period cycle or whether the various ups and downs reflect no more than distinct historical events.

The argument in favour of thinking there is a cycle is the comparative regularity of the undulation revealed.

The case against it is that economic progress, as measured by real income a head, must follow one of the following courses:

1. Constant rate of progress.
2. Continually falling rate of progress.
3. Continually rising rate of progress.
4. Rate of progress sometimes higher and sometimes lower.

But only the last of these is probable. Yet if this is the course of advance, then it is in the nature of any trend we fit to throw up deviations on either side of the trend alternatively, and this in itself can hardly be regarded as a cycle.

The case against is further strengthened in that only three swings have been observed, a number of events which would appear altogether insufficient for emphatic judgement in favour of a cycle no matter how regular. Moreover, the first and third swings are associated with recovery from civil war and world war respectively. Only the swing from the mid-1890's to 1914 is relatively free from the upheaval of war.

For these reasons we should perhaps avoid the term 'cycle'. Perhaps we are nearest the truth if we say that fluctuations in the rate of growth of economic progress are to be expected from time to time in the expanding economy but may occur at irregular intervals and be of varying intensity.

10. For our analysis of the course of real wages in the U.S.A. we have made use of the Brown-Hopkins index of real wage rates. This index is a composite of three other indexes and is subject to some limitations, in that it is for the most part geographically confined to the north-eastern states and in that it covers a relatively narrow range of occupations, the main gap being agriculture.[1] However, the area covered is important and its relative weight was greater then than it is now. Moreover, we have compared the index of money wage rates used in the above with an index of wage rates which applies to agriculture and to, presumably, a wider geographical coverage,[2] and have found remarkable agreement in 1880–1915. In the inter-war period correspondence is less satisfactory.

The fluctuations in the rate of secular growth of real income are discernible also in the movement of real wages, the three periods of faster growth in real income a head being equally times of greater advance in real wages and periods of deceleration tending similarly to coincide (Table I).

But apart from their tendency to reveal an undulation similar to that of real income, real wages were also subject to powerful distributive changes which cut across the fluctuations in secular growth and at times almost submerge the latter. This can be clearly seen from the different levels, as distinct from fluctuation, in the rates of increase of the two series. Broadly, the changes worked to the detriment of labour before the First World War and, taking the whole inter-war period as one, to its advantage thereafter.[3] Only in one decade before the war, that of 1884–

[1] E. H. Phelps Brown and S. Hopkins, op. cit., pp. 277 and 282. The index is discussed on pp. 267–70.

[2] Index of composite farm wage rates from *Historical Statistics of the U.S., 1789–1945*, p. 97. The index is based on investigations made by the Department of Agriculture and is available intermittently for 19 years in the period 1866–1906 and annually from 1909. It is discussed, ibid., on pp. 76–77.

[3] A rough check on our results is possible by comparison with changes in the share of wages in national income. M. Kalecki estimates the share of manual labour at 33·7 per cent. of *net* national income in 1909 and 32·4 per cent. in 1928 and thereafter around 40 per cent. of *gross* national income in 1929–35 (M. Kalecki, 'The Determinants of Distribution of the National Income', *Econometrica*, vol. vi, No. 2, Apr. 1938, p. 99). For earlier years, estimates of the share of employee compensation (which includes salaries), based on King's estimate

93 which reflects the sharp rise in real wages in the early 1880's, was the rate of increase in the latter greater than in real income a head. In 1914–23 the position was reversed and it remained so throughout the inter-war period.

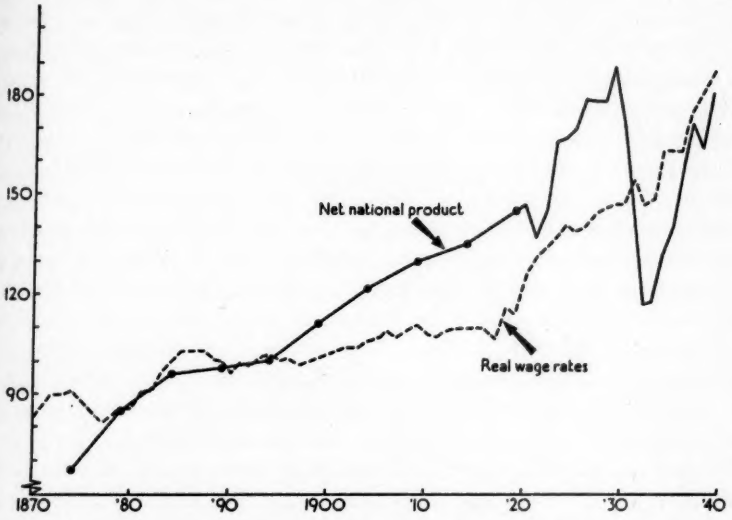


FIG. 7. U.S.A.: Net National Product (1929 prices) per Head of the Occupied Population, 1874–1939.1889–98 = 100.
Real Wage Rates, 1870–1939. 1890–9 = 100.

The graphical comparison of the movements of real wages and real income a head, given in Fig. 7, illustrates these changes more clearly. The divergent trends, indicating distributive shifts adverse to labour in the

of value of product, indicate a fall from 52·5 per cent. in the 1880's to 47·1 per cent. in the 1900's (it was 50 per cent. in the 1870's). Similar evidence based on Martin's estimates of aggregate payments, but presumably within different definitions, shows a stability around 60 per cent. from 1899–1908 to 1909–18 (S. Kuznets, *National Income, A Summary of Findings*, N.B.E.R., 1946, p. 50). The share of salaries is likely to have increased or remained stable, so we may reasonably assume that the share of wages has fallen or has at least been stable. The share of wages in national income cannot, of course, be directly compared with the movement of real wages to real national income a head without taking into account changes in the relative number of wage-earners. The proportion of the latter to all occupied persons rose from 45·6 per cent. in 1890 to 54·3 per cent. in 1910, but by 1920 it had fallen to 52·4 per cent. and by 1930 it stood at 46·9 per cent. (T. M. Sogge, 'Industrial Classes in the U.S. in 1930', *Journal of the American Statistical Association*, vol. xxviii, No. 181, Mar. 1933, p. 199). The combination of these two factors seems to confirm our findings. If the share of wages before the First World War has been but stable (or falling) while the proportion of wage-earners increased, the standard of each worker must have suffered a relative decline. In the inter-war period the share of wages remained stable or increased and the proportion of wage-earners declined, hence standards appear to have improved.

1870's and in 1885–1917, and favourable in the 1920's and 1930's, are strongly evident.

Perhaps the most striking of these shifts occurred in the period 1885–1917. In 1915 labour's gain since 1885 was no more than 7 per cent. and most of that occurred in a few years in the 1900's, while in the same period real income a head advanced by approximately 40 per cent. From Fig. 7 it is evident that this adverse movement is particularly strong from 1895 onwards. Between 1885 and 1895 real wages remained on balance either static or fell slightly while real income a head advanced somewhat, but the loss to labour was probably not much more than the relative gain it made in the early 1880's, leaving real wages very much in the same position relative to real income in 1895 as in 1880. The events of this earlier period are thus not too clearly marked, and there is some statistical disagreement concerning them (see footnote on p. 123). In the 20 years or so after 1895, however, labour's loss of relative position is severe and unmistakable.

Writing in 1915, W. I. King[1] noticed the check to real wages and attributed it to continuing immigration of unskilled labour and the closing of the internal frontier. These factors are undoubtedly powerful influences affecting the course of real wages, yet it is doubtful if they can serve as a complete explanation. The check after 1900 can perhaps be satisfactorily explained by the sheer magnitude and nature of the influx, but its existence before 1900 is less readily explicable in this way. A glance at the immigration statistics will suggest the reason. More than 13 million persons entered the U.S.A. in 1900–15, a number far in excess of that of any other comparable period in U.S. history, but only less than 4 million immigrated in 1890–9.[2] Similarly, the attractiveness of the West to settlers must have been greater in the 1890's than 10 or 15 years later. Yet real wages follow a course not significantly different throughout both periods. If immigration and the closing of the internal frontier were the major factors involved one would, clearly, expect the course of real wages to follow more closely that of immigration, and show a break in trend towards the close of the century.

An alternative explanation of the check can be found in the movement of the general price level. This is emphasized by A. H. Hansen,[3] although other factors are also given some weight. He points out that for more than a hundred years real wages moved inversely with the general price level. Thus, real wages rose in 1820–49, 1865–97, and after 1920—all times of falling prices, while the trends were reversed in 1849–65 and 1897–1919.

[1] W. I. King, *The Wealth and Income of the People of the U.S.A.*, 1915.

[2] *Historical Statistics of the U.S., 1789–1945*, p. 37.

[3] A. H. Hansen, 'Factors Affecting the Trend of Real Wages', *American Economic Review*, vol. xv, No. 1, 1925, p. 27.

This relationship applies also to shorter fluctuations, and the explanation for it is to be found in the stickiness of wages relatively to other prices. Hansen admits, however, that real wages did not move inversely with prices in the 1870's. Nor do they rise in 1885–97 when prices were falling. In fact, they show no change in trend at all to correspond to the reversal in the movement of prices in 1897.[1]

Probably a more important factor bearing on the labour market than either immigration or relative inflexibility of wage-rates was the increasing concentration of industrial control and the growth of monopolistic combination and practices. With a greater degree of monopoly in the system, general product prices are likely to rise relatively to costs, thus depressing the purchasing power of any given level of money wages, and money wages may themselves be subject to greater pressure if there is an increase of buyers' monopoly in the labour market. Moreover, such a development is likely to exert a specially important influence at a time when the labour and trade-union movement, though growing, was numerically weak[2] and politically undeveloped.

Whatever the causes, there is little doubt as to the existence of the check itself. Some allowance must be made for inadequacies in the wage-materials, but these can hardly be of such magnitude as to invalidate the results. If, then, our findings be accepted we may have to re-examine more critically the suggestion, sometimes advanced, of a labour shortage in the U.S.A. in the period under discussion. Prima facie it appears more likely that in 1885–1917 and perhaps earlier immigration and natural increase was more than sufficient to satisfy the growing demand for labour at any rate in the industrial sector of the U.S.A. This is confirmed by the unemployment percentages in Manufacturing and Transport, which show that in 11 out of the 26 years covering the period 1889–1914 unemployment exceeded 5 per cent.[3]

11. We may conclude with a brief comparison of development in the U.S.A. and the United Kingdom in the 20 years or so before the First World War.

By way of a counterpart to the British climacteric which came in the 1890's and lasted until 1914 we can find nothing in the U.S.A. beyond some retardation in the rate of growth. Moreover, the check in the United Kingdom lasted considerably longer and was accompanied until 1907 not

[1] A. H. Hansen's index of real wages diverges from the Brown-Hopkins index in that it rises in 1889–97 by *c.* 20 per cent. and falls thereafter. Hansen's index does therefore move inversely with the price level in this period. The divergence in the indexes appears to be due to the use by Hansen of a cost-of-living index probably less reliable than is available now.

[2] Only 2·7 per cent. of all gainful workers were members of a labour union in 1900. By 1910 the percentage had risen to 5·8. (*Historical Statistics of the U.S., 1789–1945*, pp. 64 and 72.)

[3] Paul Douglas, *Real Wages in the U.S., 1890–1926*, 1930.

by retardation but by a major expansion in the U.S.A. Far from the two economies following a pattern of growth sympathetic in direction, they are in the late nineteenth century nearer to exhibiting a rhythm of growth opposite to each other. This is the case in 1894–1907 when the rate of growth is rising in the U.S.A. while the United Kingdom suffers almost a standstill, but it does not apply in 1907–14 when the U.S. reversed its trend to resemble more closely United Kingdom experience. Unlike the United Kingdom, however, the U.S.A. did not cease its advance but merely slowed down its pace. The different rhythm of growth in the U.S. and the United Kingdom cannot be gone into here, and it is at any rate discussed elsewhere.[1] For our purposes it must be sufficient to point to the existence and alternation in both countries of fluctuations in secular growth, set in motion by similar forces,[2] and to note, in particular, the divergence in intensity and duration in the 20 years or so before the First World War.

Comparison of the movements of real wage rates shows a check in both countries. In the United Kingdom real wages actually declined from the late 1890's while in the U.S.A. the increase in the 30 years from 1885 to 1916 amounted to no more than 7 per cent. The fact that real income a head was rising rapidly in the U.S.A. at this time is a clear indication of the distributive character of the check. In contrast, the decline of real wages in the United Kingdom can only in part be attributed to distributive factors. The main emphasis there must be placed on the check to national productivity which depressed other incomes as well as wages. Even had labour maintained its relative position, real wages would only have remained stable.

12. Summary

1. The starting-point for our paper is the fluctuations in the rate of secular growth of real income noted by S. Kuznets. Three swings, with peaks in the late 1870's, the early 1900's, and the mid-1920's, and troughs in the early 1890's, in 1910–12, and in the mid-1930's can be distinguished. (Section 2.)

2. In the absence of any advance in productivity, the transfer of resources from sectors with low to those with higher outputs a head would have raised real income a head by approximately 30 per cent. in 1870–1930. The course of such inter-sector shifts from decade to decade does

[1] A comparison of secular fluctuations in the growth of real income for the two countries over the whole period 1869–1938 is made by Professor Brinley Thomas in his article on 'Migration and the Rhythm of Economic Growth, 1830–1913', *The Manchester School of Economic and Social Studies*, vol. xix, No. 3, Sept. 1951.

[2] For a discussion on the causes of these fluctuations in the U.K. see E. H. Phelps Brown and S. J. Handfield-Jones, op. cit.

not, however, except possibly in 1910–30, suggest a relationship with the fluctuations in the growth of real income. (Section 3.)

3. Variations in the rate of growth are evident in the Manufacturing, Mining, Agriculture, Transport, and Communications sectors. Of the sectors examined, only Construction follows a pattern of its own. Three swings, following closely those in the rate of growth of real income a head, can be distinguished, thus confirming the reliability of both sets of data. (Section 4.)

4. Analysis of the trend of output a head in individual industries in 1890–1917 broadly confirms the pattern of growth indicated by the aggregate indexes. Four points are brought out: (i) the most rapid advance of the iron and steel industry; (ii) the similarity of movement amongst most industries before 1900–5, inasmuch as most shared in the general advance; (iii) the much more varied experience after 1900–5; and (iv) the divergent 'productivity history' of 'new' and 'old' industries after 1900–5. (Section 5.)

5. The long-run trend of the United States capital coefficient is found to be constant over 1894–1939, but if the coefficients for 1879–89 are included the trend may equally be interpreted as moderately rising. In the shorter run the capital coefficient tends to fluctuate inversely to the rate of economic progress as measured by real income a head. It is inferred that the fluctuations in the latter are the result of corresponding changes in the rate of application of innovations.

Statistical inadequacies and conceptual difficulties relating to the use of capital coefficients are noted. (Section 6.)

6. A few observations on the process of innovation are offered. The pattern of technical progress appears to have been dominated not so much by the mass of relatively minor improvements occurring continuously but by innovations in a small number of basic factors affecting large sectors of the economy, and alternating between periods of pioneering and periods of widespread application and fruition. (Section 7.)

7. The expansion in approximately 1870–82 may be associated with the innovations of steam power *widely* applied to industry and transport, while that of 1894–1907 can be largely ascribed to the massive extension of steam now combined with steel, and to innovation by discovery and development of new resources. Similarly the advance in 1919–29 is linked to electricity, the internal combustion engine, industrial chemicals, &c. The intervening periods were characterized by gradual exhaustion of scope for further widespread application of the innovations which are associated with the periods of faster advance. (Section 8.)

8. The term 'cycle' should be avoided in connexion with the various swings noted, since it connotes periodically recurrent oscillation, but we

may say that changes in the rate of economic progress are to be expected from time to time although they need not be regular or be of similar intensity. (Section 9.)

9. Real wages exhibit variations in growth (Table I) similar to those shown by real income a head data, but they are also subject to powerful distributive shifts, broadly adverse to labour in the 1870's and in 1885–1917 and favourable in the inter-war period. The check in 1885–1917 is particularly striking. It is discussed in terms of immigration of unskilled labour; inflexibility of wage-rates relative to other incomes, and growth of monopolistic combinations and practices. (Section 10.)

10. Comparison with United Kingdom experience in 1890–1914 shows no check in the U.S.A. comparable with the 'climacteric' in Britain. But there was some retardation after 1907, and both the United Kingdom check and the U.S.A. retardation were phases of a long-run fluctuation in secular growth apparently governed by similar forces and peculiar to both countries. A check to real wages occurred in both countries, but in the U.S.A. it lasted considerably longer (1885–1917) and was of a distributive character, whereas the main cause for it in the United Kingdom must be sought in the check to national productivity. (Section 11.)

DEPARTMENT OF SOCIAL AND ECONOMIC RESEARCH,

UNIVERSITY OF GLASGOW

APPENDIX

Statistical Sources and Methods

A. *The effect of inter-sector shifts on real income a head in the U.S.A., 1870–1930*

The proportion of persons gainfully occupied in each of the following sectors: Agriculture (including Forestry and Fishing), Construction, Manufacturing, Mining, Trade, Transport and Public Utilities, Services (D. Carson, *Changes in the Industrial Composition of Manpower since the Civil War*, Studies in Income and Wealth, vol. xi, N.B.E.R., 1949, p. 47) was multiplied in each Census year by production income a head (R. F. Martin, *National Income in the U.S., 1799–1938*, N.I.C.B., 1949, pp. 58–59) in the corresponding sectors as it stood in 1900. Increases in the sums give an indication of the effect of inter-sector shifts on real income a head.

B. *Indexes of income, wages, output a head, and capital in the U.S.A., 1869–1939. Also U.S. capital coefficient.*

1. *Real national income per head of the gainfully occupied population, 1869–1939.* Net national product, in 1929 prices, in averages calculated for decades overlapping at 5-year intervals for the period 1869–1919 (S. Kuznets, *National Product since 1869*, N.B.E.R., 1946, p. 119), and in annual form from 1919 (p. 56), was divided by the number of persons gainfully occupied, obtained for Census years from A. M. Edwards, *Comparative Occupation Statistics for the U.S., 1870–1940*, 16th Census Reports, Bureau of the Census, 1943, pp. 81 and 104, and for inter-censal years by linear interpolation. The entries in 1874, 1879, 1884, 1889, &c., relate to 1869–78, 1874–83, 1879–88, &c. 1889–98 = 100.

TABLE IV

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1869	..	..	71	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1870	..	83	74	..	..	82	..	46	..	79	..	64	56	..	..	..	36	..	..	..	..
1871	..	87	73	..	..	80	..	53	..	80	..	68	55	..	..	..	40	..	..	..	..
1872	..	90	76	..	..	91	..	56	..	86	..	64	79	..	..	..	43	..	..	..	..
1873	..	90	76	..	..	84	..	62	..	87	..	66	77	..	..	..	46	..	..	..	..
1874	67	91	75	..	..	77	..	57	..	85	..	57	70	..	..	..	44	..	..	..	..
1875	..	88	76	..	58	72	..	54	..	79	..	63	56	..	..	..	42	..	..	..	..
1876	..	84	79	..	51	69	..	51	..	77	..	63	49	..	..	..	42	..	..	..	..
1877	..	81	84	..	54	70	..	58	..	73	..	67	52	..	..	..	41	..	..	..	..
1878	..	83	87	..	48	73	..	57	..	72	..	65	55	..	..	..	41	..	..	..	..
1879	85	86	87	..	53	79	..	63	..	80	..	65	63	..	..	..	43	..	..	71	2·98
1880	..	86	93	..	61	88	..	69	..	88	..	77	84	70	89	..	50	83	83	..	..
1881	..	91	85	..	69	92	..	76	..	91	..	77	85	80	93	..	53	86	86	..	..
1882	..	91	90	..	79	94	..	83	..	95	..	84	88	92	96	..	61	90	83	..	..
1883	..	96	89	..	88	91	..	83	..	90	..	75	81	96	99	..	62	96	88	..	..
1884	96	100	93	..	93	82	..	80	..	89	..	70	68	95	91	..	65	90	88	81	3·01
1885	..	103	93	..	94	79	..	75	..	84	..	86	63	78	89	..	64	93	90	..	..
1886	..	103	93	..	97	91	..	82	..	89	..	84	84	75	86	..	68	94	87	..	..
1887	..	103	89	..	85	93	..	89	..	99	..	90	91	83	89	..	74	97	91	..	..
1888	..	101	92	..	79	93	..	93	..	95	..	94	86	91	94	..	78	99	92	..	..
1889	98	100	97	..	104	95	..	95	..	99	100	103	93	80	88	..	77	96	90	88	3·21
1890	..	96	93	..	119	99	..	106	..	101	..	106	110	89	86	..	83	101	93	..	..
1891	..	99	100	..	118	100	..	103	..	103	..	111	95	89	92	..	92	105	93	..	..
1892	..	99	95	..	129	105	..	105	..	104	..	91	104	94	96	..	96	108	98	..	..
1893	..	101	92	..	83	92	..	92	..	101	..	83	79	95	96	..	103	99	100	..	..
1894	100	102	93	..	82	87	..	85	..	93	..	104	73	98	97	..	100	97	101	100	3·59
1895	..	100	97	..	107	102	..	98	..	97	..	84	100	100	97	..	100	97	101	..	..
1896	..	101	102	..	87	91	..	95	..	94	..	92	87	102	98	..	106	94	101	..	..
1897	..	99	107	..	96	97	..	97	..	98	..	109	99	105	109	..	102	99	102	..	..
1898	..	100	111	..	82	108	..	104	..	101	..	112	119	115	113	..	110	98	104	..	..
1899	111	101	109	..	98	117	100	113	100	107	..	109	134	114	117	..	108	103	108	110	3·58
1900	..	102	111	100	63	114	98	115	104	110	..	103	130	111	112	..	116	109	110	..	..
1901	..	103	111	..	87	122	106	120	105	116	..	113	152	110	111	..	115	114	110	..	..
1902	..	104	109	..	88	134	109	124	106	122	..	113	166	114	112	100	123	116	109	..	..
1903	..	104	112	..	87	128	108	132	115	127	..	105	161	114	119	..	125	120	111	..	..
1904	122	106	115	..	95	118	108	129	114	125	..	116	146	120	116	..	126	116	108	121	3·55
1905	..	107	117	..	122	133	116	148	123	137	..	122	201	124	108	..	125	116	99	..	..
1906	..	109	122	..	122	139	119	148	124	146	..	121	221	129	111	..	135	121	104	..	..
1907	..	107	116	..	106	138	115	159	129	149	..	107	218	126	115	133	141	121	105	..	..
1908	..	109	119	..	94	109	107	128	117	132	..	121	130	128	118	..	138	113	103	..	..
1909	130	111	116	105	128	138	114	148	129	147	..	108	211	130	113	..	128	116	98	128	3·51
1910	..	108	115	108	108	139	116	159	133	152	..	104	221	132	107	..	132	119	97	..	..
1911	..	107	120	109	104	127	111	153	129	148	..	117	191	134	105	..	138	119	97	..	..
1912	..	109	122	112	109	148	123	160	136	158	..	124	241	141	103	138	132	120	97	..	..
1913	..	110	120	115	101	150	130	167	141	161	..	123	242	138	100	..	136	126	97	..	..
1914	135	110	119	115	94	139	127	154	129	151	..	124	178	142	102	..	135	121	97	138	3·66
1915	..	110	..	114	96	..	143	..	139	..	..	..	..	..	..	..	..	..	..	..	..
1916	..	110	..	117	103	..	145	..	158	..	..	..	..	..	..	..	..	..	..	..	..
1917	..	107	..	118	61	..	135	..	164	..	..	..	..	..	..	196	..	..	..	..	..
1918	..	116	..	118	28	..	130	..	163	..	..	..	..	..	..	234	..	..	..	..	..
1919	145	114	..	119	73	..	118	..	139	..	..	..	..	..	..	256	..	..	..	150	3·70
1920	147	126	..	121	61	..	129	..	159	..	186	..	..	..	..	255	..	..	..	152	3·72
1921	137	131	..	122	91	..	135	..	131	..	..	..	..	..	..	228	..	..	..	152	4·00
1922	145	134	..	124	147	..	156	..	142	..	..	..	..	..	..	237	..	..	..	152	3·75
1923	166	137	..	126	157	..	153	..	197	..	..	..	..	..	..	226	..	..	..	153	3·32
1924	167	141	..	132	157	..	157	..	187	..	..	..	..	..	..	234	..	..	..	156	3·35
1925	170	139	..	136	180	..	170	..	195	..	..	..	..	..	..	268	..	..	..	158	3·34
1926	179	140	..	140	165	..	177	..	213	..	..	..	..	..	..	279	..	..	..	161	3·24
1927	178	144	..	143	145	..	181	..	220	..	..	..	..	..	..	303	..	..	..	164	3·31
1928	178	146	..	146	136	..	190	..	221	..	..	..	..	..	..	310	..	..	..	166	3·36
1929	189	147	..	149	116	..	195	..	243	..	214	..	..	..	..	319	..	..	..	169	3·22
1930	171	147	..	151	66	..	192	..	215	..	..	..	..	..	..	319	..	..	..	171	3·59
1931	146	154	..	151	53	..	191	..	180	..	..	..	..	..	..	338	..	..	..	171	4·20
1932	117	147	..	148	21	..	168	..	146	..	..	..	..	..	..	353	..	..	..	168	5·15
1933	118	149	..	147	16	..	177	..	158	..	..	..	..	..	..	377	..	..	..	164	4·98
1934	132	163	..	145	..	..	167	..	173	..	..	..	..	..	..	388	..	..	..	160	4·37
1935	140	163	..	149	..	..	188	..	188	..	..	..	..	..	..	412	..	..	..	158	4·04
1936	160	163	..	153	..	..	203	..	222	..	..	..	..	..	..	438	..	..	..	158	3·54
1937	172	176	..	164	..	..	197	..	251	..	..	..	..	..	..	451	..	..	..	160	3·34
1938	164	181	..	176	..	..	184	..	215	..	..	..	..	..	..	468	..	..	..	160	3·51
1939	182	187	..	..	..	..	213	..	239	..	286	..	..	..	..	521	..	..	..	160	3·16

2. *Real wages rates, 1870–1938.* E. H. Phelps Brown and S. Hopkins, 'The Course of Wage Rates in Five Countries, 1860–1939', *Oxford Economic Papers* (N.S.), vol. ii, June 1950, pp. 277 and 282. The index is discussed, ibid., on pp. 267–70. 1890–9 = 100.

3. *Output per head of the gainfully occupied population in agriculture, 1869–1914.* The 'Ideal Index of Physical Production' of total net farm output from F. Strauss and H. L. Bean, *Gross Farm Income and Indices of Farm Production and Prices in the U.S., 1869–1937*, United States Department of Agriculture, Technical Bulletin 703, 1940, was divided by the number of persons gainfully occupied in agriculture. The latter was obtained for Census years from A. M. Edwards, op. cit., p. 104, and for inter-censal years by simple interpolation and extrapolation. 1890–9 = 100.

4. *Output per worker in agriculture, 1900 and annually 1909–38.* H. Barger and H. H. Landsberg, *American Agriculture, 1899–1939*, N.B.E.R., 1942, p. 251. Output (net) per worker is given in 5-year averages. 1900 = 100.

5. *Value of building permits (1913 prices) per person gainfully occupied in construction, 1875–1933.* W. H. Newman, 'The Building Industry and Business Cycles', *The Journal of Business of the University of Chicago*, vol. viii, No. 3, 1935, p. 63. Thirteen cities are included in 1875–1900; 50 in 1900–2; 20 in 1903–10; and 120 in 1911–33. Persons gainfully occupied in construction, in Census years, are from D. Carson, *Changes in the Industrial Composition of Manpower since the Civil War*, Studies in Income and Wealth, vol. xi, N.B.E.R., 1949, p. 47. Estimates for inter-censal years by interpolation. Construction of highways is not covered by the output indicator, but persons occupied thereon are included in the manpower series. 1890–9 = 100.

An alternative index based on new construction expenditures (1929 prices) and the same number of persons occupied was calculated from data in S. Kuznets's *National Product since 1869*, N.B.E.R., 1946, p. 99. The data there are derived from estimated consumption of construction materials and its calculated relationship to new construction. They are given as averages calculated for decades overlapping at 5-year intervals. 1889–98 = 100.

1869–78	62	1904–13	103
1874–83	73	1909–18	105
1879–88	82	1914–23	99
1884–93	95	1919–28	104
1889–98	100	1924–33	93
1894–1903	98	1929–38	67
1899–1908	100		

6. *Output per person gainfully occupied in manufacturing, 1870–1914.* The index of manufacturing production used is that given in E. Frickey, *Production in the U.S.A., 1860–1914*, 1947, p. 54. It is based on a sample of 40 industries which are combined into an index by way of using 'value added' as weights. Most of the important industries are included. To find the appropriate number of persons occupied in Frickey's sample we have used A. M. Edwards, op. cit., pp. 104–8, and have interpolated and extrapolated for inter-censal years. Occupational figures before 1910 are not sufficiently broken down, in each instance, to match E. Frickey's coverage, but except for his 'Iron, Steel and their products' group, the industries so affected are relatively unimportant and the exclusion of the numbers occupied in them is unlikely to affect the representativeness of the total. The Iron and Steel group is the one important group, the labour force for which cannot satisfactorily be estimated from A. M. Edwards. We have therefore made use of a comparative table in the 1900 Census of Population Report which gives the number of 'Iron and Steel Workers' in the Census years 1870–1900. The figure for 1910 was estimated by raising the 1900 figure in the ratio of employment in blast-furnace establishments and steel mills in 1909 to that in 1899. These employment figures are derived from the Censuses of Manufactures and were taken from S. Fabricant, *Employment in*

Manufacturing, 1899–1939, N.B.E.R., 1942, p. 199. Inter- and extra-polation was used for inter-censal years. 1890–9 = 100.

7. *Output per unit of employment in manufacturing, 1899–1939.* Calculated from output and employment of wage-earners indexes in S. Fabricant, op. cit., p. 331. S. Fabricant's productivity indexes were not used since they are expressed as employment per unit of output and are, in that form, not comparable to our own. The data are based on the Censuses of Manufactures, interpolated with other available sources, and can pretend to summarize the whole of manufacturing. 1899 = 100.

8. *Output per person gainfully occupied in mineral production, 1870–1914.* W. M. Persons, *Forecasting Business Cycles*, 1931, pp. 170–1. W. M. Persons's Index of Mineral Production is based on a sample of 8 minerals in 1870–8; 10 in 1879–1908, and 13 after 1909. A large part of mineral products is, however, included in all years and the index may be regarded as representative for the whole of mineral production. The index was divided by the number of persons gainfully occupied in mining and quarrying, obtained for Census years from A. M. Edwards, op. cit., p. 104, and for inter-censal years by inter- and extrapolation. 1890–9 = 100.

9. *Output per gainful worker in mining, 1899–1939.* An index of physical output in mining from *Historical Statistics of the U.S., 1789–1945*, op. cit., p. 141 (the original source is H. Barger and Sam H. Schurr, *The Mining Industries, 1899–1939*, N.B.E.R., 1944), divided by the number of gainful workers in mining, ibid., p. 64. Labour force estimates for inter-censal years by interpolation. 1899 = 100.

10. *Output per person gainfully occupied in the transportation and communication industries, 1870–1914.* E. Frickey, op. cit., p. 117, gives an index of output. This was divided by the number of persons occupied in the corresponding industries, obtained for Census years from A. M. Edwards, op. cit., pp. 104–8, and for inter-censal years by interpolation and extrapolation. 1890–9 = 100.

11. *Product (1939 prices) per worker in the transportation industries, 1889, 1920, 1929, and 1939.* H. Barger, *The Transportation Industries, 1889–1946*, N.B.E.R., 1951, p. 56. 1889 = 100.

12. *Consumption of raw cotton per person gainfully occupied in cotton mills, 1870–1914.* Raw cotton consumption from A. F. Burns, *Production Trends in the United States since 1870*, 1934, pp. 292–3. A. M. Edwards's (op. cit., p. 108) estimates of the number of persons occupied in Census years were interpolated and extrapolated for other years. 1890–9 = 100. Other measures of productivity are available in G. T. Jones's Index of Real Costs in the Massachusetts cotton industry, 1847–1920 (G. T. Jones, *Increasing Returns*, 1933, pp. 289–90) and in S. Fabricant's data (see Table V). The trend in our index is confirmed by both, reciprocals of G. T. Jones's index and the index based on S. Fabricant.

13. *Pig-iron and steel output per iron and steel worker, 1870–1914.* Output figures of pig-iron and steel ingots and castings are from *Historical Statistics of the U.S., 1789–1945*, op. cit., pp. 149 and 187. Separate indexes were constructed and combined by way of using weights approximately reflecting the ratio of output of pig-iron to steel. The weights used were equal in 1914, but the relative weight of steel was gradually reduced until in 1874 the index was based entirely on pig-iron output. The estimate of the labour force used is described above in 6. 1890–9 = 100. The index of output a head so obtained may be compared with similar data by G. T. Jones and S. Fabricant. G. T. Jones's Index of Real Costs in the American Pig Iron Industry is of little use since it reflects not so much changes in productivity as changes in profit margins, but his estimates of 'output per man in blast furnaces', 1889–1914, are of greater value (*Increasing Returns*, p. 49). The figures rebased to 1899 = 100 are as follows:

1889. . . 78	1904. . . 137	1914. . . 231
1899. . . 100	1909. . . 196	

G. T. Jones's figures are based on the U.S. Censuses of Manufactures and may be compared with the estimate of output per unit of employment in blast-furnace products, based on S. Fabricant's data, and derived largely from the same sources (Table V). Similar estimates for steel mill products are also available (ibid.).

14. *Output of bituminous coal per man-hour, 1880–1914.* Output figures from *Historical Statistics of the U.S., 1789–1945*, op. cit., p. 142. Number of man-hours worked from V. E. Spencer, *Production, Employment and Productivity in the Mineral Extracting Industries, 1880–1938*, W.P.A. National Research Project Report No. S-2, 1940. Number of man-hours worked in 1881–89 by interpolation. 1890–9 = 100. A similar index is available in V. E. Spencer, op. cit.

15. *Output of anthracite per man-hour, 1880–1914.* Sources as in 14. 1890–9 = 100.

16. *Output per unit of employment in electric light and power, 1902, 1907, 1912, and annually 1917–39.* J. M. Gould, *Output and Productivity in the Electric and Gas Utilities, 1899–1942*, N.B.E.R., 1946, pp. 70–71. 1902 = 100.

17. *Output of fermented malt liquor per gainfully occupied brewer and maltster, 1870–1914.* Output from *Historical Statistics of the U.S., 1789–1945*, op. cit., p. 187, divided by estimates of persons occupied as brewers and maltsters, obtained for Census years from A. M. Edwards (op. cit.). Other years by inter- and extrapolation. 1890–9 = 100.

18. *Tobacco products per person gainfully occupied in tobacco factories, 1880–1914.* Output figures for cigarettes (*Historical Statistics of the U.S., 1789–1945*, op. cit., p. 187), cigars, and manufactured tobacco and snuff (A. F. Burns, op. cit., Table 44) were combined into an index of production by way of using 'value added' in 1914 in each of the components for weights. ('Value added' from S. Fabricant, *The Output of Manufacturing Industry*, p. 610.) This was divided by the number of persons occupied in tobacco factories, obtained for Census years from A. M. Edwards, op. cit., and for inter-censal years by inter- and extrapolation. 1890–9 = 100.

19. *Output of flour per person gainfully occupied in milling and baking, 1880–1914.* Output of flour (A. F. Burns, op. cit., Table 44) divided by the number of persons occupied in milling and baking obtained for Census years from A. M. Edwards, op. cit., and for inter-censal years by inter- and extrapolation. 1890–9 = 100.

20. *Reproducible wealth other than household, in 5-year intervals through 1879–1914 and annually through 1919–39, per head of the gainfully occupied population.* S. Kuznets, *National Product since 1869*, N.B.E.R., 1946, p. 228. Value of real estate improvements and equipment plus inventories in 1929 prices, based on capital formation data, at 10-year intervals through 1879–1919. Estimates for 1884, 1894, 1904, and 1914 by linear interpolation. The annual estimates for 1919–39 were obtained by cumulating Kuznets's annual capital formation (ibid., p. 56) minus net changes in claims against foreign countries (ibid., p. 46), to his estimate of capital stock in 1919 (ibid., p. 228) and by taking means of adjacent years. The estimates after 1919 apply therefore to 1 June, while the earlier figures relate to 1 Jan. The labour force is the same as in col. 1. 1889–98 = 100.

21. *Capital coefficient, in 5-year intervals through 1879–1914 and annually through 1919–39.* Ratio of capital stock (as in col. 20) to net national product (as in col. 1). National product before 1919 is calculated for decades, i.e. 1874–83, 1879–88, &c., and was divided into the capital stocks for 1879, 1884, &c. The capital coefficients for 1884, 1894, 1904, and 1914 are less reliable than for other years since the capital stocks for those years were obtained by linear interpolation and depend on the assumption that accumulation was evenly distributed throughout each decade. The 1894 coefficient is, for this reason, almost certainly too low as the greatest part of the capital formation of the 1890's must have preceded the depression of the mid-1890's. The coefficients for 1879–1914 relate to 1 Jan.; those for 1919–39 to 1 June.

TABLE V

Indexes of Output per Unit of Employment in some Industries, in Census of Manufactures, Years 1879–1914. 1899 = 100

The indexes are derived from S. Fabricant, *Employment in Manufacturing, 1899–1939*, N.B.E.R., 1942. S. Fabricant's indexes are given in the form of employment per unit of output. We have used his output and employment data to calculate the reverse relation so as to make them comparable with our indexes in Table IV.

	1879	*1889*	*1899*	*1904*	*1909*	*1914*
Automobiles	..	..	100	93	106	304
Motor cycles and bicycles	..	..	100	120	180	229
Beet sugar	..	..	100	188	203	275
Blast furnace products	..	84	100	132	185	220
Steel mill products	40	66	100	105	135	134
Industrial chemicals	..	..	100	102	124	152
Petroleum refining	39	76	100	87	165	139
Paper and pulp	47	78	100	110	125	131
Printing and publishing	..	..	100	136	160	198
Woollen and worsted goods	94	90	100	107	112	114
Distilled liquor	..	..	100	78	76	98
Leather products	..	..	100	109	104	103
Lumber mill products	..	..	100	92	74	77
Flour milling	100	108	100	86	89	94

AN INTERPRETATION OF ECONOMIC BACKWARDNESS

By H. MYINT

In current discussions the terms 'underdeveloped' and 'backward' are generally used as though they were completely interchangeable by applying them to aggregate geographical concepts such as 'countries', 'areas', and 'regions', or by equating them with certain broad indices such as low incomes or capital investment per head. It is more illuminating, in my view, to give these terms different connotations by using the former to mean underdeveloped *resources*, and the latter to refer to the backward *people* of a given area. In this paper I shall argue that this distinction is fundamental to the understanding of the nature of economic backwardness.

I

The difference in approach in terms of 'underdeveloped resources' and in terms of 'backward people'[1] can best be illustrated by examining the current fashion of including not only the natural resources but also the so-called 'human resources' under the generic heading of 'underdeveloped resources', which seems to imply that the two terms we have distinguished really overlap. But is it merely a matter of taste or tact whether we choose to speak of 'backward people' or of 'underdeveloped human resources'? On a close examination it will be seen that each term has its own hinterland of associated ideas and the two cannot be superimposed on each other without creating a number of serious logical difficulties.

In common-sense terms, a 'backward people' may be defined as a group of people who are in some fashion or other unsuccessful in the economic struggle to earn a livelihood. Thus we are starting from a Classical or Marshallian distinction between man, on the one hand, and his environment on the other: only then can we think of a group of people as being successful or otherwise in adapting themselves to their environment. Further, the idea of 'backwardness' inevitably implies a comparison of different degrees of success in this economic struggle: some groups of people are less successful or 'backward' compared with other more successful or 'advanced' groups. Thus the nature of backwardness would lose much of its significance if applied to a homogeneous group of people without international economic relations. It is when a self-sufficient primitive

[1] In order to avoid misunderstanding I had better say at once that in speaking of 'a backward people', in contrast to 'an advanced people', I am referring only to economic life and do not in the least imply general cultural 'backwardness'. The qualifying word 'economic' is dropped merely for the sake of brevity.

or medieval economy has been opened up to outside economic forces and its people come into contact with other economically more 'advanced' people that the idea of backwardness suggests itself.

This way of approach at once raises a number of issues. Firstly, we shall have to make a more systematic analysis of the continuous process of mutual adaptation between wants, activities, and environment which we have described as 'economic struggle'. Secondly, in order to make a valid comparison of the varying degrees of success in the economic struggle of different groups of people we require the assumption that these different groups are in fact pursuing the same or comparable sets of ends. This is a big assumption which will have to be examined closely. Finally, we shall have to consider whether it is sufficient to measure the degree of 'backwardness' or 'advancement' of different groups of people merely in terms of the relative distribution of final incomes among them; or whether the pattern of distribution of economic activity among the different groups and the different roles they play in economic life might not in the long run offer a more significant clue to the future potential development of each group.

These will be discussed at a later stage (section IV). For the purpose of a preliminary contrast, however, it is sufficient to note that when we adopt the approach in terms of 'backward people' we are by definition making their failure in the economic struggle the centre of the problem and that this involves: (*a*) a fundamental contrast between them (the 'backward people') and the natural resources and the economic environment of their country, and (*b*) a deliberate concentration of attention on their share of incomes or economic activity either within their own country or in relation to the world at large as distinct from the total volume of output or economic activity.

When we turn to the approach in terms of 'underdeveloped resources', however, we are led to quite a different set of ideas. To treat 'human resources' on exactly the same footing as natural resources as part of the common pool of 'underdeveloped resources' is to abandon the older man-against-environment approach in favour of the modern 'allocative efficiency' approach. We are then concerned, not with the success or failure of a given group of people in their struggle against their economic environment (including other groups of people), but with the allocation of given 'resources' among alternative uses as determined by the price system or by the central planner or by a mixture of both. The aim of this allocative process is to maximize total output, and 'underdevelopment' becomes a species of deviation from the productive optimum defined in some sense or other.

We can now see that although, physically speaking, the same people are

involved when we speak of 'backward people' and of 'underdeveloped human resources', the standpoint adopted in each case is different. From the first standpoint, these people are regarded as actors (even if unsuccessful ones) in the economic struggle. From the second, they are regarded as impersonal units of 'underdeveloped' resources not distinguishable from units of other types of underdeveloped resources except by the degree of underdevelopment defined in some functional sense. Thus we are not specially concerned with 'human resources' more than with other types of resources except in so far as it could be shown that 'developing' the human resources would in fact increase the total output by a greater extent than by developing other 'material' resources.

The difference between the 'backwardness' and the 'underdevelopment' approach becomes very clear when we exclude human resources from the definition of 'underdeveloped resources' and confine it entirely to natural resources. This is by no means an unusual or deliberately contrived 'strong case' to boost our distinction. As a matter of fact, much of the thinking on the subject is still influenced by the idea of 'underdeveloped countries' as those which (whatever their 'human resources') possess a greater amount of potential natural resources waiting to be developed compared with the 'developed countries' whose natural resources have already been fully brought into use. We may also note how the use of such expressions as 'underdeveloped countries', 'underdeveloped areas', 'underdeveloped regions', &c., tends to foster this belief in the existence of potential natural resources.

Here, once we have excluded the human beings from the 'underdeveloped resources', a number of propositions emerge. Since they will recur again in the course of our argument, they may be summarily stated at this stage. (1) 'Underdevelopment' of natural resources and 'backwardness' of people are two distinct phenomena and they need not even always coexist: thus the inhabitants of the 'overpopulated' countries which admittedly have very little natural resources left for further unaided development are also generally 'backward'. (2) When 'underdeveloped' natural resources and 'backward' people coexist, they mutually aggravate each other in a 'vicious circle'; but this mutual interaction is an essentially dynamic and historical process taking place over a period of time and may be too complicated and qualitative to be easily fitted into the formal quantitative framework of optimum allocation of resources (including capital resources) suggested by the pure 'underdevelopment' approach. (3) Although the 'underdevelopment' of natural resources may cause the 'backwardness' of the people, it does not necessarily follow that any efficient development of natural resources resulting in an increase in total output will always and *pari passu* reduce the backwardness of people. On

the contrary, the problem of economic backwardness in many countries has been made more acute, not because the natural resources have remained 'underdeveloped', but because they have been as fully and rapidly developed as market conditions permitted while the inhabitants have been left out, being either unable or unwilling or both to participate fully in the process.

II

Let us now turn to the logical difficulties which arise from attempts to superimpose the 'backwardness' and the 'underdevelopment' approach on each other. These can be best illustrated by examining some of the typical arguments in favour of increasing the flow of investment from the 'advanced' to the 'underdeveloped' countries.

Advocates of plans for the international economic development of the underdeveloped countries generally start by saying that the case for alleviating the poverty and discontent, ill health and ignorance of the peoples of these countries can be made whether we approach the subject from a humanitarian standpoint or purely in self-defence to ease the storm-centres of international relations. At this stage therefore the problem seems to be set out in terms of human misery and discontent, in terms of 'backwardness' rather than in terms of 'underdevelopment' of resources. Indeed, the existence of 'underdeveloped' natural resources at least, far from creating a 'problem' in the relevant sense, may be regarded as part of the means of solving it. When, however, we pass from this initial statement of the problem to the later parts of the economic development plans which contain a more technical treatment of the proposals and 'target figures' for investment, we generally encounter a shift from the 'backwardness' to the 'underdevelopment' approach. The existence of 'underdeveloped' natural resources is no longer regarded as the means of solving the problem; it has become the problem itself. The argument then proceeds as though the phenomenon of the 'backwardness' of the people can be satisfactorily accounted for purely in terms of the 'underdevelopment' of the resources and deviations from the optimum allocation of world's capital resources (cf., for example, United Nations Report, *Measures for the Economic Development of Underdeveloped Countries*, ch. viii).

It is now time to consider the meaning of 'underdeveloped resources' more closely. In the language of optimum theory, it seems to describe two types of deviation: (i) less than optimum amounts of these 'underdeveloped' resources have been used in producing final output, and (ii) less than optimum amounts of capital have been invested to augment the quantity and improve the quality of these 'underdeveloped' resources. Where the first occurs by itself it would be possible to increase the total

output of the underdeveloped countries without outside investment merely by reorganizing their own existing resources by such measures as legal and administrative reforms, the mobilizing of domestic savings, and so on. In current discussion, although this possibility is admitted, it is considered that as a rule the two types of deviation occur simultaneously, the first caused by the second. That is to say, the scope for a more productive reorganization or 'development' of the resources of the underdeveloped countries is limited without first removing the basic cause of 'underdevelopment', viz. an insufficient flow of investment from the 'advanced' countries.

The typical arguments in favour of increasing investment in the underdeveloped countries may now be examined. They may be classified according to the degree of optimism concerning the richness of the 'underdeveloped resources'.

i. The most optimistic type of argument assumes that as a rule underdeveloped countries possess *natural* resources capable of being developed by private investors on a purely commercial basis and this process will automatically help to raise the standard of living of the people of these countries. 'Underdevelopment' is therefore caused by 'artificial' obstacles and restrictions to the free international movement of private capital. Whatever our views about the richness of potential natural resources, this type of argument serves to illustrate a sharp clash between the 'underdevelopment' and the 'backwardness' approach. For, on a closer examination, it turns out that the only type of investment which private investors are willing to undertake in the underdeveloped countries is the exploitation of raw materials, e.g. petroleum, and it is precisely in this field that the governments of the underdeveloped countries are frequently unwilling to admit private foreign capital because they fear that this 'nineteenth-century type of investment' will merely develop the natural resources and not the people and will result in 'foreign economic domination' aggravating the economic 'backwardness' of their peoples. This is a genuine deadlock to which no satisfactory answer can be given in terms of the simple 'underdevelopment' approach. And to dismiss the whole thing merely as irrational economic nationalism seems suspiciously like throwing the baby away with the bath water (see section VI below).

ii. The next type of argument may be regarded as an attempt to retrieve the 'underdevelopment' approach by introducing the Pigovian concept of the 'social' productivity as distinguished from the 'private' productivity of investment. Here it is argued that although the underdeveloped countries may not possess (or are unwilling to make available) resources which can be developed by private enterprise, they can nevertheless very profitably absorb large sums of international investment in the form of

public enterprises using a broader criterion of 'social' productivity. These enterprises would include public utilities, transport, hydro-electric and irrigation schemes, &c., which offer economies of large scale and scope for complementary investment and where only a public agency can collect the diffused social returns by means of taxation. A good example of a direct application of this argument may be found in the United Nations Report on *National and International Measures for Full Employment.* Here the authors, after recommending that the International Bank for Reconstruction and Development should be used as the main channel of inter-governmental lending to reduce political risks on both sides, lay down the following conditions:

'The criteria of worthwhileness for the loans should be their effect on national income, taxable capacity and export capacity. The Bank should *not* in general lend, unless it is convinced that in consequence of the loan, the borrowing country's current balance of payments will improve sufficiently to permit interest and amortisation payments to be made.'[1]

'Development loans should be made at interest rates uniform for all borrowing countries.' (Op. cit., pp. 93–94.)

These two conditions may be regarded as the logical limits to which the investment policy towards the underdeveloped countries can be liberalized on the basis of the Pigovian concept of 'social' productivity of investment. It may be noted that fairly substantial amounts of capital can still be absorbed by some of the underdeveloped countries within these limits. But comparing this view with the general run of discussions on the subject, it soon becomes apparent that many advocates of international development plans would consider the Pigovian conditions as too restrictive to be regarded as a serious basis of investment policy towards the underdeveloped countries. There are two possible ways out of this impasse. The first, which we shall recommend in the later part of this paper, is to make a clean break with the whole 'underdevelopment' approach and to adopt a more direct approach to the problem of economic backwardness of the people. The second and more popular alternative is to try to broaden the 'underdevelopment' approach still further; and this brings us to the third type of the under-investment argument.

iii. The argument at this stage consists in attempts to stretch the concept of 'social productivity' or 'desirability' by invoking (*a*) the principle of 'needs', and (*b*) the dynamic principle of trying to stimulate further rounds of loan investment by 'productive' grants to 'improve social capital', particularly in the fields of public health, education, and communications. A good example of this may be found in a later United

[1] We are not concerned here with the question how far this rule can be reconciled with the authors' practical proposals for stabilizing longer-term lending by fixing target figures. Cf. also A. E. Kahn, 'Investment Criterion for Development Programmes', *Quarterly Journal of Economics*, Feb. 1951.

Nations Report on *Measures for the Economic Development of the Underdeveloped Countries.*

Here the authors argue:

(*a*) that 'the amount that can be profitably invested at a 4 per cent. rate of interest depends on the amount which is being spent at the same time on improving social capital; and especially on public health, on education and on roads and communications. There is much to be done in this way in the underdeveloped countries before they will be in a position to absorb large amounts of loan capital' (para. 269);

(*b*) that the underdeveloped countries 'cannot borrow' for these purposes, presumably because 'they could not meet the full burden of loan finance' (paras. 270 and 277);

(*c*) that, therefore, grants-in-aid should be made to the underdeveloped countries, but purely for 'productive' purposes (paras. 271 and 276).

The authors do not, however, hesitate to invoke the principle of needs. Thus:

'The principle that the better off should help to pay for the education, the medical services and other public services received by the poorer classes of the community is now well established within every Member nation of the United Nations. The idea that this principle should also be applied as between rich and poor countries is relatively new. It has however been put into practice on several occasions.' (Para. 272.)

How far are these attempts to stretch the idea of 'social' productivity successful?

To begin with, there is an important shift in the basic definition of the 'underdeveloped countries' which is not as clearly stated as it might be. Up to now the main burden of the argument has been on the proposition that 'underdeveloped countries' possess a greater amount of 'underdeveloped' resources than the developed countries and that therefore the 'social' productivity of investment is higher in the former than in the latter. From now on the emphasis has shifted to the fact that the underdeveloped countries have lower *per capita* incomes and therefore suffer from greater needs than the developed countries.

The introduction of the principle of needs does not create any difficulties provided we are prepared to keep it clearly apart from the principle of productivity. Then loans should continue to be made strictly on the productivity principle while grants should be made *separately* on the need principle.

This, however, results in somewhat unpalatable conclusions. (*a*) When we are allocating loans, our main concern is to maximize the total world output and not to equalize international incomes. Thus the social productivity curves of investment must be constructed objectively, and independently of our value judgements concerning needs. This means that capital should not be diverted in the form of low interest loans or grants to the poorer countries simply because they are poor. A more *economic*

way of reducing inequalities in the international distribution of income is to allocate the world capital resources in uses where its social productivity is highest even if it happens to be in the richest countries, and to redistribute the resultant output after first ensuring that it is maximized. (*b*) Conversely, when we are allocating grants, our concern is with a more equitable international distribution of incomes and not with their effects on total output. Thus grants should be made in the form of final consumers' goods and services, directed not only towards the poorer countries but also towards the poorer sections within each country. The principle of need in its strict form is an argument for diverting final incomes from the richer to the poorer countries for consumption purposes and not an argument for diverting capital grants for 'productive' purposes.

These conclusions are not without relevance to the practical issues of economic policy in the underdeveloped countries. Thus critics of the unsuccessful developmental ventures of the British Overseas Food Corporation and the Colonial Development Corporation may reasonably maintain that the root cause of the failure lies not as much in the wrong choice of men and inefficient methods of administering the ventures but in the vagueness of the mandate itself which tries to compromise between the principle of obtaining economic returns and the principle of needs. They may say that rather than waste huge sums of money by investing in projects which cannot be justified on the strict productivity principle, it were better to distribute them as free gifts of consumers' goods and services among the poor of Africa. Again, individuals and governments in underdeveloped countries sometimes find themselves with large sums of money which they cannot profitably or safely invest locally; and then, following the strict productivity principle and the need to protect their capital, they have found it wiser to invest it in the most developed countries such as the U.S.A. or the U.K.

The last example, however, brings out the unsatisfactoriness of trying to apply the static rules of the productive optimum to the problem of the underdeveloped countries. This, however, is rather damaging to the conventional definitions of the 'underdeveloped' countries both in terms of 'underdeveloped' resources and in terms of low *per capita* incomes. For now it begins to transpire: (*a*) that if we take the productivity curves of international investment on the basis of existing economic conditions in the 'developed' and the 'underdeveloped' countries, more often than not capital is likely to be more productive in the former than the latter and the Pigovian distinction between 'social' and 'private' product will not appreciably change the broad picture; (*b*) that therefore if we were to allocate capital according to the existing productivity curves, even taking a generous view of 'social' productivity, this would still result in relatively

greater quantities of capital being invested in the 'developed' than in the 'underdeveloped' countries, accentuating the unequal rate of economic development between the two types of country; and (*c*) that a policy of a more equal redistribution of international incomes based on the pure principle of needs, although it may relieve the burden of cumulative unequal rates of economic development, does not touch the heart of the problem; for fundamentally the problem of the 'underdeveloped' countries is not merely that of low or unequal distribution of final incomes but also that of unequal participation in the processes of economic activity.

Faced with these considerations, those who wish to retain the 'underdevelopment' approach are obliged to 'dynamize' it and to refer to social productivity in the *longer run* as distinct from the *present* social productivity of investment.

We are now in a position to examine the argument of the authors of the United Nations Report on the *Measures for the Economic Development of the Underdeveloped Countries*. It will be seen that the crux of their argument lies in the question how far 'improving social capital' in public health, education, and communications, whether financed by grants or loans, can successfully stimulate further rounds of loan capital. Thus the authors' appeal to the principle of need in para. 272 (also implicit earlier on, e.g. para. 248) turns out to be a side-issue. It is a confusing side-issue at that because the requirements for creating incentives for further investment and those for promoting economic equality do not always conveniently coincide in the same policy as the authors have implied. On the contrary, there are many instances where the incentives for further investment can be created only by pursuing relatively disequalizing policies, such as control of domestic wages, tax exemptions to new (foreign) enterprises, &c. (Cf., for instance, 'Industrialisation of Puerto Rico', *Caribbean Economic Review*, Dec. 1949, by Prof. A. Lewis, one of the authors of the Report.)

Turning to their main argument, the extent to which further rounds of loan investment can be effectively stimulated by a policy of 'improving social capital' by grants must depend on a wide variety of circumstances which vary from country to country and about which no definite generalizations can be made. We are no longer in the static world where 'under-investment' in a particular line can be deduced in principle by an inspection of the *given* social marginal productivity curves and where there is a definite functional relationship between the quantity of capital invested and the quantity of 'returns' in the form of final output. Thus given favourable circumstances, a small amount of 'investment' in social capital might start a chain-reaction and yield 'returns' in the form of secondary rounds of investment out of all proportion to the initial investment. On

the other hand, if circumstances are not favourable, even a larger amount of initial investment might not successfully start these secondary rounds of activities, and there is no real guarantee that increasing the amount of the initial investment still further would induce the desired results. In reply to such objections, the authors can only appeal to the general presumption that if average incomes per head or expenditure per head in the type of social services they have chosen is low, then longer-run social productivity of investment in 'social capital' is likely to be high. This general presumption is not as strong as it appears, and there are two general arguments which may be advanced against it.

The first is clearest in the case of education and technical training although it can be applied also to other types of 'social capital'. It is the fairly common experience of the underdeveloped countries to find themselves, not merely with an overall shortage of educated people, but also with a relative shortage of those regarded as 'socially productive', such as engineers and doctors, combined with a relative abundance of those regarded as less socially productive, such as lawyers and clerks. The reason for this is, of course, that with the existing social and economic organization of these countries there is a relatively greater market demand for the latter type of person than the former. This would seem to suggest that the problem of creating and organizing demand for trained personnel in the underdeveloped countries may even be more important than the problem of creating the supply by investment in 'social capital'. Given the demand, the supply of trained personnel of most types (including those trained abroad) would seem to respond more automatically and to a greater extent than is usually allowed for. On the other hand, there is less indication that the demand can be effectively stimulated merely by creating the supply without simultaneously introducing far-reaching changes into the economic structure. Thus most underdeveloped countries can provide numerous instances of graduates from technical and agricultural colleges who cannot be absorbed, because the existing economic structure cannot be changed quickly enough to absorb them, although in terms of broad averages the amount of money spent per head of education and technical training is quite modest. The common fate of these people is to suffer a form of intellectual 'disguised unemployment' by taking up appointments as clerks and ordinary school teachers (cf. J. S. Furnivall, *Colonial Policy and Practice*, pp. 380–2). Thus there is a genuine tendency for a great deal of investment in 'social capital' to be wasted, although the full extent of this wastage is concealed because expenditure on education and technical training is classed under the head of social services and not subject to the strict profit-and-loss accounting of other types of state enterprises.

This leads us to the second argument, which is rather disconcerting to

the economic theorist. The application of fairly sophisticated economic theory involving concepts of social productivity and induced investment tends to create the impression that we have now opened up new possibilities of investment in the underdeveloped countries which were unappreciated and unexplored by the governments and administrators of these countries. This, however, overlooks two circumstances. Firstly, a substantial part of capital inflow into the underdeveloped countries was in the form of government borrowing even in the heyday of private investment. Secondly, the governments of the newly-opened-up countries have always been impelled by a powerful 'self-interest' to try to obtain adequate revenues to meet the expanding costs of administration. Thus, untutored as they may be in economic theory, they have been obliged by practical necessity to borrow and deploy their loans and grants in ways not so different from the recommendations of the present-day economic experts. The moral of this argument is not merely that there is less scope for the deployment of 'productive' loans and grants (as distinct from those social service expenditures which are frankly based on the principle of need) than appears at first sight. There is a further consideration which cuts across the whole of the 'underdevelopment' approach. For, as we shall see, ironically enough, where the governments of the underdeveloped countries have been successful in stimulating private (foreign) investment, the result has frequently been too great and rapid an expansion in a few lines of primary production for export which further aggravated the problem of the adjustment of the indigenous peoples of these countries to outside economic forces. Thus again, we are led back from the consideration of the total quantity of investment and the total volume of output and economic activity to a consideration of the type of investment and the distribution of economic activities and economic roles between the backward peoples and the others.

This is a convenient point at which to pause and summarize our argument so far. (i) The problem of the so-called 'underdeveloped countries' consists, not merely in the 'underdevelopment' of their resources in the usual senses, but also in the economic 'backwardness' of their peoples. (ii) Where it exists, the 'underdevelopment' of *natural* resources and the backwardness of people mutually aggravate each other in a 'vicious circle'. (iii) While (ii) is very important, it needs to be handled with care, for it is liable to distract our attention from the real problem of economic backwardness. Thus, impressed by the connexion between the 'backwardness' of the people and the 'underdevelopment' of the resources, many have sought to superimpose these two concepts on each other and to explain the former entirely in terms of the latter. In doing so, however, they are continually obliged to stretch and shift the basis of their argument: from the 'under-

developed' *natural* resources to the 'underdeveloped' *human* resources; from the 'private' to the 'social' productivity of investment; from the principle of 'productivity' to the principle of 'need'; and finally, from the static idea of the optimum allocation of investible resources to the dynamic idea of stimulating further rounds of investment by 'productive' grants. It is fair to say that, in spite of all these contortions, the real issues of backwardness seem to have eluded the grasp of the 'underdevelopment' approach. (iv) Thus in order to push our analysis farther to the heart of the problem, it would seem desirable to make a clean break with the 'underdevelopment' approach and to recognize the problem of 'backwardness' as a major problem in its own right which may occur even where there is no important 'underdevelopment' of resources in any of the acceptable senses. To emphasize this we shall speak from now on of 'backward' and not 'underdeveloped' countries.

III

At this stage it will be seen that there are at least two other 'obvious' explanations of 'backwardness' which must be considered as seriously as 'underdevelopment' in relation to some of the backward countries. But like 'underdevelopment' itself, we shall have to leave them aside in our search for a more general approach to the problem.

The first, of course, is the 'overpopulation' approach which not so long ago used to occupy a central position in discussions now dominated by the idea of 'underdevelopment'. Here again we may agree that backward peoples generally tend to have high birth-rates and that therefore 'overpopulation' and 'backwardness' tend to aggravate each other in another of those 'vicious circles' which are a feature of the whole subject. But this still leaves important gaps in the explanation. While overpopulation may be a major cause of backwardness in some countries, it does not explain why other countries not suffering from manifest population pressure should also be similarly backward. Moreover, some backward countries, e.g. most of those in south-east Asia, initially started from sparse populations in relation to their natural resources. It is only after they have been 'opened up' to international trade that they have tended to become overpopulated, partly because their death-rates have been reduced and partly because their resources have been developed in a few special lines of primary production for export which are subject to diminishing returns. Here, overpopulation cannot be regarded as the cause of backwardness; rather it is a manifestation of the maladjustment of backward peoples to outside economic forces at the physical level. Nor need this maladjustment always take the form of overpopulation. In some cases of extreme backwardness the size of the backward populations has been known to diminish to the

point of extinction. Finally, the degree of overpopulation depends, not only on the relation between the physical quantity of natural resources and the size of population, but also on the level of technical and economic development of the people. Thus advanced industrial countries can usually maintain a denser population at a higher standard of living than the backward agricultural and pastoral countries. Further, in the past the advanced countries have absorbed very large increases in population without lowering their standard of living; indeed, many would maintain that these increases were a necessary part of their even greater rates of expansion in output and economic activity.[1] Thus to try to account for economic backwardness purely in terms of population pressure is to leave unanswered the question why the economically backward peoples have been unable to increase their productivity to match the increase in their population while the economically advanced people have managed to increase their standard of living on top of large increases in population.

The second possible line of approach is in terms of the deliberate and legalized political, economic, and racial discriminations imposed on the 'backward' peoples by the 'advanced' peoples. Here again, although this appears to be a major factor in certain countries, notoriously in Africa, it does not explain why the indigenous peoples of other countries who are not subject to such obvious discriminations to the same extent should also be similarly backward. Here, of course, the definition of the nature and extent of discriminations raises very formidable difficulties which we must frankly by-pass if we are to get farther on with our analysis. We shall thus content ourselves with drawing a somewhat crude working distinction between the deliberate and therefore directly remediable causes of backwardness in the form of open and legalized *discriminations* and the more fortuitous and intractable *disequalizing factors* which may operate even where there is a perfect equality of formal legal rights between different groups of people in their economic relations with each other (cf., however, section V below).

We are now able to sketch the general outlines of our problem. When the backward countries were 'opened up' to economic relations with the outside world, their peoples had to face the problem of adapting themselves to a new environment shaped by outside economic forces. In this, whatever their degree of cultural advance in other spheres, they seem to have been conspicuously unsuccessful or 'backward' compared with the other groups of economically 'advanced' people—whatever their degree of cultural advance in other spheres. Our problem is to explain this gap, to explain why the backward people cannot stand on a 'competitive footing' with the advanced people in this 'economic struggle'. The problem is

[1] Cf. J. R. Hicks, *Value and Capital*, p. 302 n.

further complicated by the fact that the gap between the advanced and backward peoples instead of being narrowed has been frequently widened by the passage of time. Thus an inquiry into the causes of economic backwardness essentially consists in searching for those disequalizing factors which instead of being neutralized are cumulatively exaggerated by 'the free play of economic forces'.

In order to isolate these disequalizing factors, we can adopt a 'model' of a backward country which has the following broad negative specifications. (i) Initially the country started with a fairly sparse population in relation to its potential natural resources; so it cannot be said to have been suffering from 'overpopulation' to begin with. (ii) Its natural resources are then 'developed', usually in the direction of a few specialized lines of primary production for export, as fully as the world market conditions permit. This process of 'development' is generally carried out by foreign private enterprise under conditions of *laissez-faire*; but frequently the process may be aided by a government policy of stimulating expansion in investment, export, and general economic activity motivated by a desire to expand taxable capacity. So the country's natural resources cannot be said to be obviously 'underdeveloped'. (iii) Whatever its political status, its native inhabitants at least enjoy a perfect equality of formal legal rights in their economic relations with other people, including the right to own any type of property and to enter into any type of occupation; so they cannot be said to suffer from obvious discriminations in economic matters.

To those who are firmly wedded to the conventional explanations of economic backwardness this may seem like assuming away the entire problem. But when we turn and survey the different types of backward countries, it will be seen that there is a large group, for example those in south-east Asia, British West Africa, Latin America, which approximates more to our model than to any models of obvious 'underdevelopment', 'overpopulation', or 'discrimination' or a combination of all of them, if the first and the second can in fact be combined. Further, even in the other groups of backward countries where these conventional explanations are obviously very important, our model is still useful in turning attention to the residual causes of backwardness which may turn out to be by no means negligible.

IV

Before we consider our 'model' further let us examine the concept of economic backwardness more closely. We may begin by distinguishing between the 'backward country' as an aggregate territorial and economic unit and the 'backward people' who frequently form merely a group within it confined to certain sectors of the economy. Now the disequalizing factors

which we are seeking must be considered as operating, not only between the backward and the advanced countries as aggregate units, but also between the backward and advanced groups of peoples within the same backward country itself. Obviously a complete analysis of economic backwardness must take into account both sets of disequalizing factors which are closely interrelated with each other. Even so, we shall come to realize that the familiar 'countries *A* and *B*' approach of the conventional theory of international trade is seriously inadequate for our purpose and that to study the actual impact of outside economic forces on the backward people we shall have to go behind these macro-economic units to those disequalizing factors which operate within the backward country itself.

But much still remains to be done even in terms of the conventional approach, using these versatile letters *A* and *B* to denote the 'advanced' and the 'backward' countries respectively. It is only recently that the general run of economists have turned their attention to the long-run problem of unequal rates of economic growth and productivity among the different countries participating in international trade. But even so, it is fair to say that this has somewhat shaken the belief in the adequacy of the static theory of comparative costs to deal with the essentially dynamic process of growth of the international economy. Thus it is now increasingly admitted that the existing ratios of comparative costs are by no means immutable and rigidly related to the original natural resources of the countries but may be influenced to a great extent by such factors as education, experience, technical skills, and so on, which arise out of the process of international trade itself and may exert a cumulatively disequalizing influence against the countries which have a later start. Following on from this, it would seem that the gains from international trade cannot be adequately measured merely in the form of the conventional 'terms of trade' and the distribution of final incomes among the participating countries; we must also take into account the distribution of economic activities, in the form of induced investment and secondary rounds of employment, growth of technical knowledge and external economies, and all those dynamic stimuli which each participating country receives as a consequence of a given increase in the volume of its trade (cf. H. W. Singer, 'The Distribution of Gains between Investing and Borrowing Countries', *American Economic Review*, Papers and Proceedings, May 1950). Although different views may be held about the practical policies most likely to induce these secondary rounds of investment and economic activity, there is little doubt that the concept of 'induced' investment affords great theoretical insight into the nature of economic backwardness. In a sense, one might say that the difference between the

'advanced' and the 'backward' country lies in the fact that the former, subject to the powerful 'accelerator' effect, can generate its own trade-cycle while the latter merely receives the fluctuations transmitted to it from outside, although of course the size of the impact need not be smaller for that reason.

Having said this, however, it is necessary to add that an approach to backwardness which stops short at this level will be seriously inadequate and that many of the discussions on the subject have been vitiated precisely because they are couched in terms of such geographical aggregates as 'countries', 'areas', 'territories', &c. A natural consequence of this is a preoccupation with such macro-economic quantities as the aggregate and *per capita* national income, total volume of exports, total and average amount of investment, &c. Whence follow those economic development plans which aim to increase either the total or the *per capita* national income by a certain percentage by means of target figures for investment calculated on the basis of average capital requirements per head of population.

This type of macro-economic model of economic development may be suitable for the advanced countries,[1] but there are a number of reasons why it cannot be satisfactorily extended to the backward countries. To begin with, the advanced country, by definition, is in the middle of a self-generating process of economic growth characterized by a steady rate of technical innovation and increase in productivity. Thus it seems reasonable to rule out diminishing returns and assume that a given rate of net investment will, on the whole, result in a corresponding rate of increase in total output or productive capacity. Further, certain basic ratios, such as the propensity to consume, are not obviously unstable and may be used as constants for the process analysis. When we turn to the backward country, however, these assumptions are no longer plausible. The problem here is not to trace the working of the process of economic growth on the basis of certain constant proportions but to try to start that process itself. We cannot stop short at thinking in terms of overall rates of net investment and increase in total output because the two rates are no longer connected in a determinate manner by a stable average ratio of capital to output.[2] Indeed, even if we could assume constant average productivity of capital, this will not be sufficient for the purpose of many economic development plans because they rely to varying degrees on the assumption of 'external economies' and increasing returns to scale. Further, none of the basic

[1] Cf., however, T. Wilson, 'Cyclical and Autonomous Inducements to Invest', *Oxford Economic Papers*, March 1953.

[2] 'The law of large numbers' is unconvincing when applied to the industrial sector of backward economics, where instead of *n* number of firms in full working order the State is trying to start a few odd new industrial units.

ratios required as constants for the process analysis can be assumed to be stable for the relevant long period. Under the impact of outside economic forces, most of these ratios, such as propensity to consume and import, population growth, &c., have been changed or are in the process of changing. Here again it is the accepted task of economic development policy, not merely to accept these ratios as given, but to try to change them in directions considered to be favourable for development. This is not to say that all economic development plans based on macro-economic analysis will always fail. It is merely to say that it is not sufficient to stop short at this level and assume as a matter of course that, provided the required supply of capital[1] is forthcoming, the process of economic growth will work itself out automatically as it does in the advanced countries. Thus the very nature of our problem, which is to start this process of economic growth, obliges us to go behind the macro-economic units and investigate the actual structure and 'growing-points' of the backward economy. For the same reason, we cannot treat the changes in the basic ratios and propensities as 'exogenous' changes in data but must inquire into their nature and causes.

So far we have been concerned only with the mechanical difficulties of applying the macro-economic models to the backward countries. Even more serious difficulties are encountered when we inquire into the meaningfulness of macro-economic quantities such as the aggregate national income or the *per capita* income to the peoples of the backward countries. These arise in addition to the complication already noted—that 'backward peoples' normally form only a sector of the economy of their 'countries'—so that the fortunes of the 'country' and the 'people' cannot be closely identified.

Even in the advanced countries, such concepts as the increase in national income or aggregate output capacity create serious problems of interpretation once we drop the static assumption of given and constant wants and enter the real world of a continual stream of new wants and commodities and improvements in the quality of existing goods. We can, however, put aside these 'index-number' problems in favour of a 'common-sense' interpretation, since we can assume that the 'measuring rod of money' and physical productivity are meaningful to the individuals concerned and broadly approximate to the social goals they are pursuing as groups in a fairly simple and straightforward manner. When we come to the backward countries, however, this assumption has to be carefully re-examined. The peoples of backward countries have had shorter periods of contact with the 'money economy' so that the habits of mind and the symbolism associated with monetary accounting may not be deep rooted

[1] Including 'productive' grants to stimulate investment. Cf. section II above.

in their minds.[1] Further, as groups, they are subject to complex pulls of nationalism and racial status, so that there may not be a simple means–end relationship between the increase in national output and the achievement of their social goals. Thus, in many backward countries, people seem to desire up-to-date factories and other trappings of modern industrialism, not so much for the strictly material returns they are expected to yield as for the fact that they are in themselves symbols of national prestige and economic development. Following Veblen, one might describe this as a case of 'conspicuous production'.

There is then a greater need in the study of backward countries than in that of the advanced countries to go behind the 'veil' of conventional social accounting into the real processes of adaptation between wants, activities, and environment which we have described earlier on as the 'economic struggle'. When we do this we shall see that the 'problem' of the backward countries as it is commonly discussed really has two distinct aspects: on the subjective side it might be described as the economics of discontent and maladjustment; on the objective side it might be described as the economics of stagnation, low *per capita* productivity and incomes. In principle the latter should be a counterpart to the former and provide us with quantitative indices of it. In practice there is a real danger of the macro-models of economic development 'running on their own steam' without any reference to the fundamental human problems of backwardness on the subjective side.

To illustrate this, let us begin by considering the backward country as a stationary state. In terms of the objective approach this is a standard case of economic backwardness and 'overpopulation' popularly attributed to the Classical economists.[2] In terms of the subjective approach the situation may not appear so gloomy. Many of the backward countries before they were 'opened up' were primitive or medieval stationary states governed by habits and customs. Their people might live near the 'minimum subsistence level' but that, according to their own lights, did not appear too wretched or inadequate. Thus in spite of low productivity and lack of economic progress, there was no problem of economic discontent and frustration: wants and activities were on the whole adapted to each other and the people were in equilibrium with their environment. This is not to say that everything was idyllic: there may have been frequent

[1] Cf. S. H. Frankel, *Some Conceptual Aspects of International Economic Development of Underdeveloped Countries* (Princeton, May 1952), now reprinted in *The Economic Impact on Underdeveloped Societies* (Blackwell, Oxford, 1953). My debt to my colleague Professor Frankel cannot, however, be adequately expressed in terms of specific points, for I have had the benefit of discussing with him the fundamental issues of the subject for several years. I cannot, of course, claim his authority for the particular conclusions I have arrived at in this paper.

[2] Cf., however, Ricardo's *Principles*, Sraffa ed., p. 99 and p. 100 n.

tribal wars and insecurity of life and property. But on the whole it is fair to say that there was no 'problem' of backward countries in the modern sense and that the situation perhaps resembled J. S. Mill's picture of the stationary state more than that of his predecessors (cf. Mill, *Principles*, bk. iv, ch. vi).

Now consider the second stage particularly in the second half of nineteenth century and the beginning of twentieth century when these stationary backward societies were opened up to the outside economic forces. Here we can see why the term 'backward' which we have been obliged to use for lack of a better alternative is so loose and liable to different interpretations. For at this stage, and to a certain extent even today, the economic backwardness of a society was simply measured by the lack of response of its members to monetary incentives. This in effect meant measuring the backwardness of a people, not by their inefficiency and inaptness in satisfying their given wants or in pursuing their own social goals, but by their tardiness in adopting new Western standards of wants and activities. Measures for 'economic development' then consisted mainly in attempts to persuade or force the backward people into the new ways of life represented by the money economy—for example, by stimulating their demand for imports and by taxing them so that they were obliged to turn to cash crops or work in the newly opened mines and plantations. Whether it was meaningful or not to the people, the accepted yardstick of economic development of a 'country' was its export and taxable capacity.

'Backwardness' in the sense of economic discontent and maladjustment does not fully emerge until the third stage of the drama when the natural resources of the backward countries have been 'developed' to a large extent, usually by foreign private enterprise, and when the backward peoples have been partly converted to the new ways of life. Here the irony of the situation lies in the fact that the acuteness of the problem of backwardness at this stage is frequently proportional to the success and rapidity of 'economic development' at the second stage. To begin with, it becomes apparent that the backward peoples can be only too successfully converted to new ways of life on the side of wants and aspirations while this cannot be matched by a corresponding increase in their earning capacity. We then have a progressive maladjustment between wants and activities, the former outstripping the latter at each round of 'education' and contact with the outside world. (This may spread from the individual to the national level when at the fourth stage the independent national governments of the backward countries find their resources insufficient to carry out ambitious schemes of economic development and social welfare.) Further, the backward peoples now find that they cannot successfully adapt themselves to the new economic environment shaped by outside

forces and that they lag behind in the 'economic struggle' with other economically advanced groups of people who have initiated the 'opening-up' process. Thus they find themselves with a relatively smaller share of the economic activities and the national incomes of their countries although these may be rapidly increasing in the aggregate (at least up to the limits set by the diminishing returns in the new lines of the primary production for export). Here then we have the problem of economic backwardness in its full efflorescence charged with the explosive feeling of discontent and grievance against 'lop-sided economic development', 'foreign economic domination', 'imperialistic exploitation', and so on.

We can now see why it is so unsatisfactory to approach the problem of the backward countries as the source of international tension purely at the macro-economic level of the conventional development plans. Aggregates such as the total national income and volume of exports are very unsatisfactory as indices of economic welfare of a 'plural society' made up of different groups of people such as that which exists in many backward countries. Here the well-known maxim of static welfare economics, that the economic welfare of a country is increased if some people can move to a better position while leaving the others exactly as they were before, must sound somewhat galling to the backward peoples who frequently happen to be those left 'exactly as they were before'.

Nor is *per capita* income very satisfactory as an index of 'poverty'. The sort of maladjustment between wants and earning capacity which we have been describing may occur even if *per capita* incomes are rising. Indeed a greater amount of discontent may be created where incomes rise enough to introduce new commodities into the consumers' budget and then fluctuate and decline (a common experience in export economies) than where incomes per head remain stationary or decline slowly. Further, we should note that the degree of discontent depends, not as much on the absolute level of *per capita* incomes as in their *relative* ranking. Thus motives of 'conspicuous consumption' and the external diseconomies of consumption of higher income groups associated with Veblen and more recently with Professor J. S. Duesenberry should be taken into account (cf. Ragnar Nurkse, *Some Aspects of Capital Accumulation in Underdeveloped Countries*, Cairo, 1952, Third Lecture).

It is important to point this out since low income per head has now crystallized into the definition of backward countries. Some have even tried to put it on a 'scientific' basis by arguing that since the existing low incomes of the backward peoples are insufficient to provide them with the minimum nutritional requirements, their physical efficiency and productivity is lowered, thus creating a 'vicious circle'. While this may be an important long-run factor, it is a dangerous over-simplification of the

complex motivations and aspirations of the backward peoples both at the individual and national levels to assume that Communism can be 'contained' by calories. Even in the backward countries, perhaps particularly there, men do not live by bread alone. Thus as a *Times* correspondent has recently written about the wage claims in the African Copper Belt:

> 'Another factor which drives the African to make demands is his increasing needs. He is beginning to buy smarter clothes; to eat foods he never did before; to drink wine and English beer instead of native liquor. It is, indeed, an almost impossible task to-day to compile a reasonable family budget because of this transitional stage in African 'consumer' requirements. This, too, however much people may disapprove of the elaborately dressed up African 'spiv' with his cowboy hat, sunglasses, and new bicycle, is a healthy trend; it is obviously essential if the African is to be weaned from a subsistence to a cash economy that he should develop the needs that create incentive.' (*The Times*, 19 January 1953.)

If the backward peoples as individuals desire those commodities one associates with the 'American way of life', at the national level they seem to desire the latest models of social security schemes associated with the 'British Welfare State'. It would thus be a crowning-point of irony if some backward countries were to turn towards Communism through an excessive fondness for the American and British ways of life.

V

In the light of what has been said above, the study of the 'disequalizing factors' at work against the backward peoples within the economies of their countries emerges as an essential link between the two aspects of the problem of backwardness: the economics of discontent and maladjustment on the one side and the economics of stagnation or relatively slow rates of growth in total or *per capita* national income and productivity on the other.

When we consider these 'disequalizing factors' we shall see that the exclusion of the 'obvious' explanations in terms of 'underdevelopment', 'overpopulation', and 'discrimination' still leaves us with a great variety of residual causes of backwardness. To analyse them in detail is beyond the scope of this paper. For our purpose of obtaining a general interpretation of the nature of backwardness it is sufficient to point out certain broad patterns of backwardness in which the initial differences in experience, opportunities, capital supply, &c., between the economically backward and advanced groups of people seem to have been 'fossilized' or accentuated by the 'free play of economic forces'. We shall illustrate these patterns with reference to the backward peoples in their typical roles as unskilled workers, peasant producers, and borrowers of capital which

between them cover most types of economic contacts between the backward and the advanced peoples.

In order to do this we shall introduce three characteristic features of the 'opening-up' process into our 'model' of the backward economy.

i. The first concerns the nature of 'specialization' for the export market. Now it is commonly realized that 'specialization' does not merely mean moving along the given 'production-possibility' curve of the textbook; and that in practice it involves an irreversible process whereby much of the resources and the productive equipment, e.g. transport and communications, of the backward economy have been moulded and made 'specific' to satisfy the special requirements of the export market. (Hence the well-known argument for diversification.) But the habit of thinking in terms of 'countries' or 'areas' leads to the inadequate appreciation of one further fundamental fact: in spite of the striking specialization of the inanimate productive equipment and of the individuals from the economically advanced groups of people who manage and control them, there is really very little specialization, beyond a natural adaptability to the tropical climate, among the backward peoples in their roles as unskilled labourers or peasant producers. Thus the typical unskilled labour supplied by the backward peoples is an undifferentiated mass of cheap manpower which might be used in any type of plantation or in any type of extractive industry within the tropics and sometimes even beyond it.[1] This can be seen from the range of the primary industries built on the immigrant Indian, Chinese, and African labour. Thus all the specialization required for the export market seems to have been done by the other co-operating factors, the whole production structure being built around the supply of cheap undifferentiated labour.

When we turn to the backward peoples in their role as peasant producers, again the picture is not appreciably changed. Some backward economies 'specialize' on crops which they have traditionally produced, and thus 'specialization' simply means expansion along the traditional lines with no perceptible change in the methods of production (e.g. rice in south-east Asian countries). Even where a new cash crop is introduced, the essence of its success as a *peasant* crop depends on the fact that it does not represent a radical departure from the existing techniques of production[2] (e.g. yams and cocoa in West Africa). Thus as a historian has said about the palm-oil and ground-nuts trade of West Africa: 'They made little demand on the energies or thought of the natives and they effected no revolution in the

[1] Cf. S. H. Frankel, *Capital Investment in Africa*, pp. 142–6.

[2] If this condition is not fulfilled, the peasant system soon gives way to the plantation system or the peasant is so supervised and controlled that he is reduced to the status of a wage-earner except in name (cf. J. H. Boeke, *The Evolution of Netherland Indies Economy*, p. 11).

society of West Africa. That was why they were so readily grafted on to the old economy and why they grew as they did' (A. McPhee, *The Economic Revolution of West Africa*, pp. 39–40). Here again one is tempted to say that much of the 'specialization' seems to have been done by nature and the complementary investment in transport and processing. On the side of productive activities, the fact that the crop is sold for the export market instead of for domestic consumption is an accidental detail. It is only on the side of wants that disturbing changes seem to have been introduced, including a decline of skills in the domestic handicraft industries now no longer able to compete against the imported commodities. To prevent misunderstanding, it should be added that frequently the peasant methods are found to have lower costs than the 'modern' scientific methods, and that is the reason why peasant production has been able to withstand the competition of the plantation system in some countries. But at the best this merely means the survival of old skills rather than a steady improvement in the methods of production through 'specialization' for the export market.

Thus, paradoxically enough, the process of 'specialization' of a backward economy for the export market seems to be most rapid and successful when it leaves the backward peoples in their unspecialized roles as unskilled labour and peasant producers using traditional methods of production.

ii. The second characteristic feature of the 'opening-up' process is the monopoly power of varying degrees which the foreign business concerns exercise in relation to the backward economy. Here again the actual process of the growth of trade between the advanced and the backward countries differs from the textbook picture of two countries coming into trading relations with each other under conditions of perfect competition. Indeed, if we were to insist on applying the rules of perfect competition to foreign enterprises, very few backward countries would have been 'developed'. The process of opening up a new territory for trade is an extremely risky and costly business, and it is only by offering some sort of monopolistic concessions that foreign business concerns can be induced to accept the risks and the heavy initial costs, which include not only those of setting up transport and communications and other auxiliary services but may also include the ordinary administrative costs of extending law and order to places where it does not exist. Hence the age-old method of economic development by chartered companies. In the case of mining this is reinforced by the technical advantages of large-scale enterprise.

Even where there is no formal concession of monopoly power, as in a peasant economy, conditions are generally very favourable for its growth. To begin with, only fairly big firms with large enough reserves to meet the heavy initial costs and risks may venture into the new territory. Further,

although there may be no restriction to free entry, potential competitors may be put off by the 'economies of experience' which give a great differential advantage to the pioneers. Thus there are usually a small number of fairly big export-import firms engaged in a 'cut-throat' competition with each other in their effort to increase their turnover and spread their heavy overhead costs. This need not be limited to 'horizontal' competition among the export-import firms; it may also result in a 'vertical' competition between the export-import firms and the steamship companies which control the trade routes. After some time this trade war generally results in 'pools' and 'combinations' both of the horizontal and vertical types,[1] for 'the small trader must grow to greatness, either in himself, or in combination with others. The alternative is his failure and ultimate disappearance. In fact, economic conditions of England are exhibited on an intenser scale in West Africa, where businesses grow, decay and combine with mushroom rapidity.' (McPhee, op. cit., p. 103; cf. W. K. Hancock, *Survey of British Commonwealth Affairs*, vol. ii, part 2, ch. iii, sec. iii; also J. S. Furnivall, *Colonial Policy and Practice*, pp. 95–97 and pp. 197–8.)

Thus in a typical process of 'development', the backward peoples have to contend with three types of monopolistic forces: in their role as unskilled labour they have to face the big foreign mining and plantation concerns who are monopolistic buyers of their labour; in their role as peasant producers they have to face a small group of exporting and processing firms who are monopolistic buyers of their crop; and in their role as consumers of imported commodities they have to face the same group of firms who are the monopolistic sellers or distributors of these commodities.

iii. The third characteristic feature of the 'opening-up' process is the growth of the middlemen between the big European concerns and the economically backward indigenous populations. They are the necessary adjuncts to any process of rapid economic development and fill in the gaps between the highly specialized Western economic structure and the relatively unspecialized roles of the backward peoples. Although they may operate in the labour market, they are more important in their activities as collectors of produce from the peasant farmers, as distributors of imported articles to the indigenous consumers, and, most important of all, as money-lenders. In most backward countries they seem to owe their special position to their longer contact with Western economic life; frequently they may start as immigrant labour and work their way up as small traders and money-lenders. The racial distribution of the middle-

[1] This 'vertical integration' may also spread downwards towards a greater supervision and control of peasant producers resulting in a 'mixed' system between peasant and plantation systems (cf. Boeke, op. cit., ch. i).

men groups among the backward countries is familiar: thus we have the Indians and Chinese in south-east Asia, Indians in East Africa, Syrians and 'Coast Africans' in West Africa, &c. Thus the economic hierarchy of a typical backward country is generally a pyramid with Europeans on top, then the middle men, and lastly the indigenous people at the bottom.

Each of the characteristic features outlined above tends to reduce the relative share of the national incomes of the backward countries accruing to the indigenous peoples. But, as we have said before, the nature of economic backwardness cannot be fully appreciated until we go beyond the distribution of incomes to the distribution of economic activities: for 'it is to changes in the forms of efforts and activities that we must turn when in search for the keynotes of the history of mankind' (Marshall, *Principles*, p. 85.)

When we consider the backward peoples in their role as unskilled labour, it is important to ask, not merely why their wages have remained low but why they have been frozen into their role of cheap undifferentiated labour with little vertical mobility into more skilled grades. Here, apart from the monopsony power of the employers, various complex factors are at work to stereotype their role; out of these we may select three as being fairly typical (cf. Wilbert E. Moore, *Industrialization and Labor*, ch. v, for a more systematic analysis).

The first is the very high rate of turnover of indigenous labour, partly because the backward peoples are unused to the discipline of the mines and plantations, and partly because they have one foot in their traditional tribal and village economies which make them look upon wage labour not as a continuous permanent employment but as a temporary or periodical expedient to earn a certain sum of money. Given this rapid rate of labour turnover, there is no opportunity to acquire the experience and skill for promotion to skilled grades. If this were the only cause, one might assume that this is a transitional problem which would gradually disappear with the breakdown of the traditional social institutions and the spread of money economy. But unfortunately there are other obstacles.

This brings us back to the difficulties which we by-passed when defining the nature and extent of 'discrimination' against backward peoples. Here, with reference to the lack of vertical mobility of indigenous labour, we must frankly admit that our distinction between 'discrimination' and 'disequalizing factor' wears very thin in many backward countries. Even where there is no official colour bar, unofficial industrial colour bar is fairly widespread (for example, say, the Rhodesian copper-mines). Even where 'discrimination' has not hardened into a 'bar' of any sort, the natural and frequently unconscious tendency of the white employers to mark off 'native' or 'coloured' occupational categories irrespective of individual

differences in ability and skill can be very damaging to the backward peoples; for the educational effect of apprenticeship and promotion to skilled grades in ordinary economic life is more far-reaching than huge sums of money spent on educational institutions.

The third factor which has contributed to the fossilization of the 'cheap labour' convention is the additional supplies of labour which mines and plantation can draw, either from the breakdown of tribal societies (e.g. the Ashanti Wars in West Africa) or from the human reservoirs of India and China. Importation of immigrant labour has been blessed by liberal economic policy as contributing to the international mobility of labour; and it may be freely admitted that 'economic development' and the rapid growth of output of tropical raw materials could not have been achieved without it. But as a solution to the problem of human backwardness it has been somewhat unhappy. It has not appreciably relieved the population pressure in the donating countries; and in the receiving countries, apart from the complex social problems it has created, it has robbed the indigenous people of the chance to acquire vertical mobility in the labour market through the automatic operation of the laws of supply and demand and the principle of substitution.

Let us now turn to the backward peoples in their role as peasant producers in relation to the middlemen and the big export-import firms. Here we have the familiar disequalizing factors, such as the peasants' ignorance of market conditions, which are extremely unstable, their lack of economic strength to hold out against middlemen and speculators, and their need to borrow money at high rates of interest, which have reduced the relative share of incomes accruing to the backward peoples. It may also be freely admitted that this has been helped by their well-known 'extravagance' and lack of thrift which are after all the logical consequences of too successful a policy of creating economic incentives for the production of cash crops. The formal framework which offers perfect equality of economic rights offers no protection, and the result of the 'free play of economic forces' under conditions of fluctuating export prices is the well-known story of rural indebtedness, land alienation, and agrarian unrest (cf. Furnivall, *Colonial Policy and Practice*, passim). Here again we should go beyond the distribution of incomes to the distribution of economic activities. We shall then see that the real damage done by the middlemen lies not in their 'exploitation', considerable as it may be in many cases, but in the fact that they have put themselves between the backward peoples and the outside world and have robbed the latter of the educating and stimulating effect of a direct contact (cf. Hancock, op. cit., pp. 225–7). As a consequence, even after many decades of rapid 'economic development' following the 'opening-up' process, the peoples of many backward

countries still remain almost as ignorant and unused to the ways of modern economic life as they were before. On the side of economic activities they remain as backward as ever; it is only on the side of wants that they have been modernized, and this reduces their propensity to save and increases their sense of discontent and inequality (cf. Ragnar Nurkse, *Some Aspects of Capital Accumulation in Underdeveloped Countries*, 1952, Third Lecture).

Finally, we may comment briefly on the backward peoples in their role as borrowers. Here, when we inquire closely why they are obliged to borrow at very high rates of interest from the money-lenders, we frequently find that high risks and the difficulties of finding suitable outlets for liquid funds may be more important than an overall shortage of saving. It is true that the rigid sterling exchange standard of some backward countries (which works like the gold standard) may have a deflationary bias, particularly during periods of rapid extension of the money sector. But, in spite of this, it is difficult to establish that there is an overall shortage of saving for the backward economy as a whole. In the 'advanced' or Western sectors at least, big business concerns can raise loans on the international market on equal terms with the borrowers from the advanced countries and the banks generally tend to have a very high liquidity ratio.

This leads us to the problem which is apt to be obscured by the 'under-investment' approach which stresses the overall shortage of capital supply. It is the problem of organizing the *distribution* of credit as distinct from the problem of increasing the total supply of saving. The 'retail distribution' of credit among peasant producers is beyond the capacity of the ordinary commercial bank and, in spite of the rise of the co-operative movement, still remains one of the unsolved problems of the backward countries which may have greater long-run significance than the more spectacular projects for economic development. Further, there is a great need to extend credit facilities not only to the peasant producers but also to the growing class of small traders and business men among the backward peoples who would like to enter into the traditional preserves of the middlemen. Here many would-be business men from the backward groups frequently complain of the 'discrimination' against them by the commercial banks when the truth of the matter is that they are simply caught up in a vicious circle of lack of business experience resulting in a lack of credit-worthiness. The banks, far from discriminating, are playing strictly according to the 'rules of the game', but these rules tend to put the heaviest handicap on the weakest players.

That the real 'bottleneck' may frequently lie in the difficulties of organizing the distribution of credit and finding suitable outlets for existing savings, rather than in the overall shortage of saving, may also be seen

from the fact that domestic saving even where it exists in sizeable amounts is normally used for money-lending on the basis of land and jewellery mortgage since this yields a very much higher rate of return to the savers than any other available form of 'productive' investment.

VI

The idea of economic backwardness put forward in this paper may be better appreciated in terms of the deviations, not from the static concept of the allocative optimum, but from the dynamic presumption concerning the beneficial effects of free trade held by the older generation of liberal economists. For it will be remembered that the Classical case for free competition was based, not as much on the purely static considerations of allocative efficiency as on dynamic considerations of economic expansion. Thus it was believed that the growth of individualism and economic freedom would encourage initiative and enterprise, thrift, industriousness, and other qualities favourable to the dynamic expansion of the economy both horizontally, through the international division of labour and the extension of the market, and vertically, through capital accumulation and technical innovations. (Cf. L. Robbins, *The Theory of Economic Policy*, p. 16; also H. Myint, *Theories of Welfare Economics*, ch. iv.)

This line of thought is worth pursuing. The Classical economists did not claim that the free play of economic forces would necessarily lead to a more equitable distribution of wealth; as a matter of fact, they believed that inequalities of incomes (on the basis of equal opportunities) were necessary to provide the incentives for economic expansion: thus a redistribution of incomes from the rich to the poor might discourage saving, and poor relief (whether on a national or an international scale) might aggravate the population problem. As a corollary to this, they denied that the free play of economic forces would set up disequalizing factors which would ultimately inhibit the expansion in the total volume of output and economic activity.

As is well known, this Classical vision of harmonious economic growth through free enterprise has been shattered by two major factors: the growth of monopoly and imperfect competition, and the growth of unemployment. These did not, however, immediately lead to a reconsideration of the long-run theory of economic development on the Classical lines, for many economists have been too preoccupied with the purely static effects of imperfect competition, as in much of modern welfare economics, or with purely short-run problems, as in much of modern Keynesian economics. It is only fairly recently that the tide has turned, and the economics of backwardness, apart from its practical interest, may

now come to occupy an important position in its own right as an essential element in the new theory of long-run economic development.

One of the most interesting developments in the long-run theory of economic development is Professor Schumpeter's well-known argument that the growth of monopoly, which from a static view would result in a maldistribution of resources, might actually favour technical innovations and economic development (J. Schumpeter, *Capitalism, Socialism and Democracy*, chs. vii and viii). We have already seen a parallel case of this argument when we were led to the conclusion that monopoly was an essential element in the 'opening-up' process of the backward countries to international trade. The question then arises: can the Schumpeter argument be extended to the backward countries or is there a fundamental difference in the operation of monopoly in the backward countries as compared with the advanced countries?

Recently Professor J. K. Galbraith has put forward a theory which seems to provide a part of the answer. He maintains that the growth of monopoly in the advanced countries, particularly in the U.S.A., has been accompanied by a growth of 'countervailing power' on the opposite side of the market, e.g. trade unions, retail chain stores, co-operative societies, farmers' unions, &c. The growth of monopoly increases the gains from building up the countervailing power and induces its growth and this provides a new self-regulatory mechanism to the economy in a world of monopoly (J. K. Galbraith, *American Capitalism*, 'The Concept of Countervailing Power'). In Professor Galbraith's terminology, then, economic backwardness may be described as a phenomenon which arises because the process of 'economic development' has been too rapid and the initial conditions too unfavourable to give rise to an effective 'countervailing power' to check the 'foreign economic domination' of the backward peoples. One remarkable thing about Professor Galbraith's argument is that although he is concerned with the economically most advanced country in the world, the U.S.A., the sectors of the economy which he regards as being particularly in need of the countervailing power—agriculture, consumers' goods market, and the labour market—are exactly paralleled in the backward countries with their export-import monopolies and large scale mining and plantation businesses (cf. Galbraith, op. cit., chs. x and xi).

Now if we were merely concerned with the problem of backwardness in its subjective aspect as the economics of discontent it would be sufficient to show how the working of the disequalizing factors set up by the free play of economic forces in the absence of countervailing power has resulted in the present situation. But we must go on to the other side of the problem and investigate the relation between the disequalizing factors

and economic stagnation or the slow rate of growth in total output and economic activity (apart from the unfavourable effects of political and social unrests, both on present production and future investment).

Here, as we have noted above, we must be on guard against the convenient supposition that the requirements of economic equality and economic development always work in the same direction. Bearing this in mind, when we consider the typical process of 'economic development' of most backward countries there seem to be prima facie reasons for thinking that the disequalizing factors have affected not merely the distribution but also the rate of growth in the total volume of output and economic activity.

The fundamental assumption of liberal economics is that the free play of economic forces would lead to the maximum development of *individual* talents and abilities; whereas in practice the free play of economic forces in backward countries has resulted, not in a division of labour according to individual abilities, but in a division of labour according to stratified groups. The accurate selection of the different types and qualities of natural resources by the automatic market mechanism contrasts dramatically with its lack of selectivity concerning human resources which has resulted in the 'fossilization' of the backward peoples in their conventional roles of undifferentiated cheap labour and unspecialized peasant producers. Thus, unless we are prepared to subscribe to the doctrine of inherent racial inferiority of the backward peoples, there seems to be a strong presumption that the potential development of the backward countries has been inhibited by this waste of human resources, leading to a stultification of the possible 'growing-points' of the economy. Nor can the loss of educational opportunities be adequately remedied by 'investment in human capital' as is frequently assumed. Mere increase of expenditure on technical training and education, although it may offer a partial relief, is really too weak and unselective to be an active countervailing force to the deep-seated disequalizing factors. Too great an emphasis on the 'under-investment in human capital' therefore tends to confuse the issues and distract attention from the more potent disequalizing factors.

Further, the disequalizing factors work not only on the supply side but also on the demand side, and unequal distribution of incomes and of activities combine with each other to inhibit economic development. One of the most important reasons why the backward countries have been prevented from enjoying the stimulating effect of manufacturing industry is not the wickedness of foreign capitalists and their exclusive concern with raw material supplies but merely the limitation of the domestic market for manufactured articles (cf. Ragnar Nurkse, *Some Aspects of Capital Accumulation in Underdeveloped Countries*, First Lecture).

When we were discussing the concept of 'social productivity' towards

the end of section II above, we remarked on the tendency of economic practice to forestall economic theory. So also here, with the concept of 'countervailing power'. Long before the economists were aware of the problem, practical administrators and economic historians of the backward countries were impressed by the fact that the peoples of these countries seem to need some sort of countervailing power to enable them to stand up against the 'free play of economic forces'. Some have sought the countervailing power in the preservation of the traditional social institutions and, in extreme cases, have even toyed with the idea of a retreat into the self-sufficiency of the traditional stationary state. Others, more forward-looking, have tried to foster countervailing power in the form of co-operative societies and, more recently, by means of trade unions and marketing boards for the peasant produce. Above all this, the disequalizing forces themselves have generated a fierce nationalism among the backward peoples which is the most powerful source of countervailing power in the present times. So we are already in a position to learn a few lessons about the nature and limitations of the countervailing power in the backward countries.

The first lesson is that some sources of countervailing power, like the co-operative societies, themselves need a fairly high degree of business-like behaviour and 'economic advance' and can only be fostered very slowly in the backward countries. The second lesson is that it is easier to redistribute existing incomes than to redistribute and stimulate economic activity by the use of countervailing power. The governments of some backward countries are now able to obtain a larger share of the income from the exploitation of the natural resources, either by striking better bargains with foreign mining concerns or by means of marketing boards in the case of peasant produce; but they are still faced with the problem of reinvesting the money in a directly productive way as distinct from increasing expenditure on general social services. It is difficult enough to find outlets for productive investment in backward countries; it is far more difficult to find those outlets which will increase the direct participation of the backward peoples in the processes of economic activity. It is important to stress this point because the governments of the backward countries, in their desire to have rapid and spectacular economic development, may be tempted to embark on those large-scale projects which, even if they were successful as business concerns, might not appreciably increase the participation of their peoples in the new economic activities.[1] Apart from its failure as a business concern, the fundamental weakness of the famous 'Ground Nut Scheme' of the British Overseas Food Corporation was that

[1] In some countries excessive central planning may give rise to a new class of 'middlemen' in the guise of government agents or officials.

in an attempt to have rapid results on a large scale the Corporation was obliged to minimize the African participation in it.

The final lesson to be learnt is the danger of an excessive use of the countervailing power combined with an extreme economic nationalism. As a counter-measure to the disequalizing forces at the international level, discriminatory and protective measures to change the existing terms of comparative costs and foster the national economies of the backward countries have their place. In certain circumstances, they may even have a favourable effect on the volume of international trade in the long run. But, on the other hand, the dangers of an excessive nationalist policy should not be underrated. The loss to the backward countries in this case is not merely consumers' loss through having to pay a higher price or through having to put up with poorer qualities of commodities substituted for imports; a far heavier loss may lie in the sphere of economic activities when cut off from the stimulating contact with the outside world. This is also true of trade unions. In some backward countries trade unions have the very important function of breaking the industrial colour bar; but in others they may become a crippling burden on the economy and inhibit economic progress (cf. *Report on Cuba*, by the Economic and Technical Mission of the International Bank for Reconstruction and Development, pp. 138–59).

These considerations should not, however, blind us to the genuineness of the disequalizing factors working against the backward peoples and their real need for countervailing power. From the point of view of these peoples this is where the real rub lies. It is, however, precisely on this point that economists, both of liberal and of central-planning persuasion, have shown the least sympathy and understanding. The liberal economist is apt to believe that the disequalizing factors do not exist and that all attempts to use the countervailing power are the result of 'irrational economic nationalism'. The central planner is apt to seek a solution of the essentially distributive and structural problems of economic backwardness in terms of bigger and better aggregative economic development plans. Thus the study of the disequalizing factors at work against the backward peoples has never really been allowed to emerge from the intellectual underworld of extreme economic nationalism.

OXFORD

Note to p. 142:

In some cases, however, there may be an important divergence between the social productivity of investment to the community and the 'private' productivity to the government interpreted narrowly in terms of quick revenue receipts. Sometimes governments may actually discourage new domestic industries to protect their vested interests in customs and excise duties.

RECONSIDERATION OF A GROUP WELFARE INDEX: A REJOINDER ON MARGINAL PREFERENCE[1]

By JEROME ROTHENBERG

MR. ARMSTRONG'S extremely able 'Comment'[2] has done much to clarify in my own mind the essence of his original article and the issues on which my position differed, or should have differed, from his own. I am grateful for the clarity of his presentation, and thank him for providing me with the opportunity to reformulate my position in what I hope will be a more revealing way.

My 'Rejoinder' will parallel Armstrong's 'Comment' and deal in the same order with the three subjects he discusses there: (1) a criticism of one of his demonstrations; (2) the question of whether the basic conclusions of his article follow from his axioms; and (3) the significance for his thesis of my psychological interdictions against the concept of marginal preference.

I

Armstrong defends his demonstration purporting to show that the assumption of intransitivity of indifference itself (i.e. without the concept of marginal preference) suffices for a more powerful analysis of group-welfare scales than under the traditional assumption of transitivity. It might be worth while to reproduce the issue.

Consider the two man group consisting of individuals α and β. The problem is to rank social states A and B on a group-welfare scale. Individual α prefers A to B, while individual β prefers B to A. By traditional analysis, no ranking is defined for such a situation. Armstrong demonstrates that incorporation of the assumption of intransitivity of indifference into the analysis succeeds in achieving a ranking. He introduces 'situations' C and D. Individual α prefers A to C and C to B; β is indifferent between A and D, and between D and B (while, consistently, preferring B to A). He then speaks about 'situation C for α combined with situation D for β'. α prefers A to such a 'combination' and prefers the combination to B; β is indifferent between the 'combination' and A, and also between the 'combination' and B. A is therefore group-preferred to the 'combination', and the 'combination' is group-preferred to B. So, since *preference*—even if not indifference—is transitive, A is group-preferred to B.

[1] I am greatly indebted to Professors Haskell Coplin, Robert Grose, and Joseph Epstein, and Messrs. David Good and Marvin Tomber of Amherst College for their kind assistance with the material of this 'Rejoinder'. The author, of course, assumes full responsibility for the final product.

[2] In *Oxford Economic Papers*, October 1953.

I argued in my critique that the validity of this demonstration hinged on the meaningfulness of the 'combined situation C for α and D for β', and that in general it was not an inconsistent construction only in the absence of 'external consumption relations'. If external consumption relations were present, then C could be uniquely ranked by α along with A and B only if it were a situation specifying real income for *both* α *and* β. Similarly for D. Consequently, except when C and D were identical situations, a 'combination' of 'C for α and D for β' would not represent a single self-compatible situation in its own right comparable with A and B.

Armstrong rebuts this by arguing that the combined situation can be interpreted in a manner which, while admitting the possibility of external relations in consumption, avoids this logical difficulty. C is defined to be a situation where α is to consume some commodity vector X and believes β will consume commodity vector Y. D is defined as a situation where β is to consume some commodity vector Y' and believes α will consume vector X'. The combination of C for α and D for β simply refers to a situation where α is to consume X and β is to consume Y', while α incorrectly *believes* that β is to consume Y and β incorrectly *believes* that α is to consume X' (where $X \pm X'$ and $Y \pm Y'$). So long as their beliefs are incorrect when C and D differ, there is no logical contradiction.

It is certainly true that external relations in consumption, and for that matter, all consumer behaviour, depend on the consumers' beliefs about external circumstances. But this fact does not justify Armstrong's interpretation. What is the context within which we are observing the consumer? We are not, I submit, watching him making actual choices in the historically directed real world. The highly restrictive 'selection' of situations C and D dispels this notion. We are rather submitting him to an experimental procedure in which *we* must direct him to consider the situation C or D and the 'combination'. How shall we direct α to consider C? Must we not specify: 'C is a situation where you receive X and β *receives* Y'? How shall we direct him to consider the combination? Can we say: 'The combination is a situation in which you receive X and you believe β receives Y, but in reality he receives Y' while mistakenly believing that you receive X'''? If α responds at all to this, will it not be as though the situation were simply: α receives X and β receives Y'? This, however, is not what Armstrong means by the 'combination'. Furthermore, it is not permissible to direct α to the combination by telling him only: 'You receive X and β receives Y.' In such an instance he would simply be responding to C, not to the 'combination'. Since the same argument holds for β, one would be directing β to respond simply to D ('you get Y' and α gets X'').

Armstrong's demonstration, then, would not appear to differ from the following: 'α prefers A to a certain situation C while β is indifferent between A and a different situation D. α finds B inferior to the situation C while β is indifferent between B and the different situation D.' α and β are not comparing A and B to the *same* other situation, so the rules concerning transitivity of *group* preference, whereby A was judged group-preferred to B, do not apply. If Armstrong asserts that his 'combination of C and D' is a unique situation, he must show that it is operationally different from asking α to compare A and B with C and β to compare A and B with D.

What my disagreement comes to, then, is that the interpretation of a 'combined situation C for α and D for β' which I believe Armstrong is advancing does not appear to be capable of operational specification. I am not, of course, arguing that no operationally meaningful interpretation of such a combined situation is possible. Indeed, I welcome at Armstrong's hands a more appropriate alternative formulation.

Armstrong's defence with respect to preferences based on the *fact* of other individuals' consumption (rather than merely on the *belief* about others' consumption) does not seem satisfactory either. He argues:

> The fact that, on this view, it may be logically impossible to combine the situations C and D does not imply that it is logically impossible to have a combination of 'welfare of α corresponding to C' and 'welfare of β corresponding to D'. On the contrary, any combinations of individual welfares that are separately conceivable are logically possible . . . though it might be claimed that logical rigour needs an axiom to this effect. If this be granted, then by axiom (5) a group-welfare is conceivable that is lower than the group-welfare of A and higher than the group-welfare of B; and, therefore, the group-welfare of A is higher than the group-welfare of B.'[1]

What the introduction of C accomplishes is to indicate that for α, who prefers A to B, a state is conceivable possessing—to use Armstrong's terminology—a level of α's welfare lower than A but higher than B. β's ranking of D shows that a different state is conceivable for which the level of β's welfare is perceived to be the same as for A and for B, even though the welfare level of B is higher than that of A. But this demonstration does not show a *single* hypothetical situation which—by the ordinal rules—is *group*-preferred to B while being inferior to A. (Only the comparison of A and B with a single intermediate state carries with it group-preference implications in ordinal analysis.) Armstrong's demonstration can indicate that A is group-preferred to B only if it uses intermediate situations C and D to throw light on the relative preference intensities of α and β for A and B; *and* then goes further to postulate some transformation by which α's preference intensities are to be compared with β's.

[1] pp. 2–3, 'Comment'.

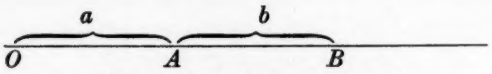
Indeed, he does this; but only by means of the concept of marginal preference, and not solely by Assumption (axiom) (5). In other words, his proof here is incomplete: it waits upon his later construction of a cardinal group-welfare index.

II

The really significant aspect of Armstrong's article and his 'Comments' is his derivation of a cardinal utility index for a single individual and for a group of individuals from the concept of marginal preference and Assumptions (or axioms) 5 and 6. It will be remembered from my article that the derivation involves two steps: 1, that a cardinal utility index can be constructed for each individual in the group; and 2, that the individual cardinal indices can be combined to form a unique cardinal group index of utility. My article argued that if one accepts the concept of marginal preference as employed by Armstrong, then individual cardinal utility indices can clearly be constructed; but combining these indices to form a unique cardinal group index requires making an assumption in addition to Assumption (5) (and, I would now argue, Assumption (6)).

Armstrong, in his 'Comment', suggests that his Assumptions (or axioms) 5 and 6 are sufficient to generate logically a cardinal group index and that my position involves rejection of Assumption 5 and, hence, implicit criticism of ordinal preference theory which he claims employs the same assumption. I must confess that Armstrong's powerful defence and his taunt that I must after all be opposed to Assumption 5 *have* smoked me out into a further examination of my position. I offer this as excuse for the following reformulation of the same material. What, then, is exactly involved in Armstrong's derivation? Since I find the basic disagreement in step 2 (see preceding paragraph), I shall assume in the following that preference intensities can be empirically measured. Thus, given the argument of my article, I am assuming that unique[1] individual cardinal utility functions can be constructed. As in Part III of my article, I shall drop this assumption at a later stage.

Let us assume, then, that there exists a psycho-physical continuum of individual preference intensities which is subject to measurement.



Degree of Preference Intensity →

We may translate this into Armstrong's terminology as follows:

[1] Unique at least up to a linear transformation: I did not discuss Armstrong's interesting suggestion for further restricting the index by empirical specification of a zero point.

The preference intensity of situation A over situation O for some individual is a (a cardinal number); the preference intensity of B over A is b; the preference intensity of B over O is $(a+b)$ which exceeds both a and b. The operation of addition can be performed on indices of preference intensity because measurement on the continuum is unique up to a linear transformation.

Definition 1. Individual welfare variation $\equiv$ the change in an individual's cardinal utility index when he moves from some situation A to some situation $B \equiv$ a function of the preference intensity of B over A:

$$V^i_{BA} \equiv \Delta U^i_{BA} \equiv U^i_B - U^i_A = V^i(P^i_{BA}) \quad (i = 1, 2, \ldots, m),$$

where $U^i_B =$ individual i's utility index for situation B, and $P^i_{BA} = i$'s preference intensity index for B over A.

Assumption 1. Group-welfare variation for any two situations A and B is an increasing function of the welfare variations of the individuals comprising the group:

$$V_{BA} = \Delta U_{BA} = g[(U^1_B - U^1_A), (U^2_B - U^2_A), \ldots, (U^m_B - U^m_A)]$$
$$= V(P^1_{BA}, P^2_{BA}, \ldots, P^m_{BA}).$$

$$A, B = A, B, \ldots, L, \quad \text{and} \quad \frac{\partial V_{BA}}{\partial P^i_{BA}} > 0 \quad (i = 1, 2, \ldots, m).$$

Definition 2. Marginal preference is a unique constant preference intensity just barely perceived by the individual as preference. (This would appear to be a reasonable interpretation of Armstrong's usage, especially in view of the philosophic justification he offers for his procedure.)

$P^i_0 = k^i$, where P^i_0 is marginal preference for individual i, k^i is a cardinal number, and $k^i \lessgtr k^j$ for all $i \neq j = 1, 2, \ldots, m$.

Now let us introduce Armstrong's 'Assumption (5)' as Assumption 2.

Assumption 2. 'Any individual welfare variation sufficient to give rise to preference, causes a greater . . . variation of group-welfare than any individual welfare variation sufficient only to give rise to indifference.'

$$\frac{dV_{BA}}{dP^i_{BA}} \Delta P^i_{BA} < \frac{dV_{DC}}{dP^j_{DC}} \Delta P^j_{DC},$$

where $\Delta P^i_{BA} < k^i$, $\Delta P^j_{DC} \geqslant k^j$, for all i, j including $i = j$; and for all A, B, C, D including $A = C$, $B = D$ where $i \neq j$.

From the assumption of a measurable preference intensity continuum, and from Definitions 1 and 2 and Assumptions 1 and 2, Armstrong infers:

$$k^1 = k^2 = \ldots = k^m \quad \text{and} \tag{I}$$

$$V_{BA} = V^1_{BA} + V^2_{BA} + \ldots + V^m_{BA} + b \tag{II}$$

(for all A, B; b is a constant).

Are these inferences warranted? Let us examine the implications of Assumption 2 (Armstrong's Assumption 5).

From Assumption 1,

$$dV = \frac{\partial V}{\partial P^1}dP^1 + \frac{\partial V}{\partial P^2}dP^2 + \ldots + \frac{\partial V}{\partial P^m}dP^m. \tag{1}$$

Assuming that the preferences of each individual are independent of the tastes of the other individuals, we substitute (1) into Assumption 2,

$$\left.\begin{aligned} &\frac{\partial V}{\partial P^i}dP^i < \frac{\partial V}{\partial P^j}dP^j, \quad \text{where} \quad dP^i < k^i,\ dP^j \geqslant k^j \quad (i \pm j = 1, 2, \ldots, m) \\ &\text{and} \\ &\frac{\partial V}{\partial P^i}dP^i > \frac{\partial V}{\partial P^j}dP^j, \quad \text{where} \quad dP^i \geqslant k^i,\ dP^j < k^j \quad (i \pm j = 1, 2, \ldots, m) \end{aligned}\right\}, \tag{2}$$

if and only if (*assuming V is continuous*)

$$\frac{\partial V}{\partial P^i}dP^i = \frac{\partial V}{\partial P^j}dP^j \quad \text{where} \quad dP^i = k^i \quad \text{and} \quad dP^j = k^j \quad (i \neq j = 1, 2, \ldots, m). \tag{3}$$

This result means that if the group-welfare variation index is subject to Armstrong's Assumption 5, then it must be such that an individual welfare variation arising out of marginal preference for any one individual gives rise to the same group-welfare variation as any other individual's welfare variation arising from his marginal preference. This is, of course, substantially Armstrong's result.

For what kind of V functions will this hold?

Writing V_i for $\partial V/\partial P_i$ $(i = 1, 2, \ldots, m)$ we may rewrite (3) as

$$V_i dP^i = V_j dP^j \quad \text{for all } i \neq j = 1, 2, \ldots, m$$

or, since $dp^i = k^i$ and $dP^j = k^j$,

$$k^i V_i = k^j V_j \quad \text{for all } i \neq j = 1, 2, \ldots, m,$$

so

$$V_i = a_{ji} V_j \quad \text{for all } i \neq j = 1, 2, \ldots, m; \tag{4}$$

where $a_{ji} = k^j/k^i = \text{constant}$.

This system of partial differential equations has, for a general solution:[1]

$$V = f(w^1 P^1 + w^2 P^2 + \ldots + w^m P^m), \tag{5}$$

where the w's are constant and, since

$$\frac{\partial V}{\partial P^i} > 0, \qquad \frac{dV}{d\left(\sum_{i=1}^{m} w^i P^i\right)} > 0.$$

[1] Thus, let $w^1 P^1 + w^2 P^2 + \ldots + w^m P^m = S$. Then, $V_i = \frac{dV}{dS}\frac{\partial S}{\partial P^i} = w^i \frac{dV}{dS}$ for all i. Consequently

$$V_i \div V_j = w^i \frac{dV}{dS} \div w^j \frac{dV}{dS} = \frac{w^i}{w^j} = \text{constant}.$$

Substituting (5) in condition (3), we obtain:

$$w^i \frac{dV}{d\left(\sum_{i=1}^{m} w^i P^i\right)} dP^i = w^j \frac{dV}{d\left(\sum_{1}^{m} w^i P^i\right)} dP^j = (P^i = k^i,\ P^j = k^j), \quad (6)$$

or

$$w^i k^i = w^j k^j \quad \text{for all } i, j. \quad (7)$$

Thus, since we may interpret each $w^i P^i$ as V^i, we have a group-welfare index in which group-welfare variations are calculated as a function of the sum of individual welfare variations, and such individual variations, as measured in marginal preference units, are given equal weight in the group index for all individuals. Armstrong's case is the specific one where $f\left(\sum_{i=1}^{m} w^i P^i\right) = \sum_{i=1}^{m} w^i P^i$, and $k^i = k^j$ for all i, j, and therefore (from (7)), where $w^i = w^j$ for all i, j. His is obviously not the only solution possible, but the general solution does no violence to what seems essential in his position—namely, that the group-welfare effect arising out of each individual's marginal preference is the same, and therefore may serve as the effective unit of measurement for the group index.

It is my contention, however, that Armstrong's complete derivation, wherein he introduces Assumption (6), does not give rise to a V function that fits even special cases of (5). His V function is such that a determinate group-welfare index can be constructed only with the aid of an additional set of assumptions—the explicit relating of the group-welfare effect of different individuals' marginal preference which I discussed in my article.

Armstrong introduces Assumption (6) because he feels that the index derived without it is ordinal and becomes cardinal only by its inclusion. 'Assumption (6) implies . . . that group-welfare is determinate (a conclusion that is not warranted by (1), (2), (3), and (5) alone), for, since group-welfare can vary within the limits of indifference, we are now asserting that that variation is small as compared with other variations and is, in fact, small in an absolute sense.'[1] Moreover, failure to incorporate (6) will occasionally lead to situations which violate the spirit (although not the letter) of Assumption (5). Specifically, Assumption (6) says:

Assumption 3. 'If, in a group, there is a variation of the situation of one individual, within the limits of his indifference, then the variation of group welfare is trivial.'[2]

An example of the trouble which can arise when Assumption (6) is excluded is given forthwith. Assume we have a linear group welfare

[1] *Utility and the Theory of Welfare*, p. 267.

[2] Ibid.

variation function V, for a 100-member group. Moreover, assume the following:

(*a*) $w^i = 1$ for all $i = 1, 2, \ldots, 100$;

(*b*) $k^i = 1$ for all $i = 1, 2, \ldots, 100$;

(*c*) $P^1_{BA} = 40$; $P^j = -\frac{1}{2}$ for all $j = 2, \ldots, 100$,

$$V_{BA} = \sum_{i=1}^{100} w^i P^i_{BA} = 40 - 49\tfrac{1}{2} = -9\tfrac{1}{2}.$$

The group index V would proclaim A group-preferred to B; yet no one prefers A other than intra-marginally, while someone strongly[1] prefers B to A. This kind of result appears to do violence to the purpose for which Assumption (5) was originally introduced. Moreover, for practical purposes, if only marginal and extra-marginal preference intensities can be in fact measured for each individual, but not intra-marginal preferences,[2] then it is hazardous to use the group index to make even ordinal comparisons of different situations (as the example just presented shows: an inability to measure the intra-marginal preference intensities of the 99 indifferent individuals makes it impossible to know whether the group prefers A or B). This is especially true when one is dealing with large groups. But it is of just such groups that welfare economics must speak.

Introduction of Assumption (6) resolves this difficulty. In the example above, the further restriction imposed by Assumption (6) enables us to assert that B is group-preferred to A, since if *all* intra-marginal preferences are trivial, then they cannot cumulate into substantial sums for moderate sized groups. Furthermore, inability to measure these trivial intensities results in no significant analytic loss.

But what are the mathematical implications of this assumption of triviality? By linear equation (5), an individual welfare variation can give rise to a trivial group welfare variation if, and only if, for this individual i, w^iP^i is trivial when $P^i < k^i$. For the practical purposes envisaged, 'triviality' would appear to be translatable as being less than some arbitrarily small number—or, in less technical language, being 'of infinitesimal order'. w^iP^i, then, must be less than some arbitrarily small number when $P^i < k^i$. But P^i is continuous; so it may approach arbitrarily close to k^i. If w^i is the same for $P^i < k^i$ and for $P^i \geqslant k^i$, then w^iP^i, when $P^i < k^i$, approaches arbitrarily close to the value $w^iP^i_0$ (where $P^i_0 = k^i$). In Armstrong's derivation $w^iP^i_0$ is the unit of measurement for each individual's welfare index and, since the group index is only a function of the sum of these individual indices, it is the unit of

[1] Relatively speaking. In principle, the same difficulty is raised in non-linear V functions —i.e. where V is a non-linear function of S.

[2] A not unrealistic prospect, considering the currently available psycho-physical methods of scaling.

measurement for the group index as well. Can the unit of measurement for a non-infinitesimal scale be continuous with, and only infinitesimally greater than, an infinitesimal? I should think not.

Can one resolve this dilemma by choosing a larger unit of measurement? Such a unit can be chosen at will so that, in any concrete analytic situation, all possible (or, to be less restrictive, all *probable*) combinations of individual intra-marginal preferences in the particular group at hand will cumulate to only a trivial group-welfare variation. But this unit must then represent a very much larger preference intensity than marginal preference, depending on the size of the relevant groups. In such an event, what, then, is to be the function of the concept of marginal preference upon which, presumably, Armstrong's whole presentation rests? Marginal preference has at least a rough-and-ready reasonableness for serving as a cut-off point between those acknowledged preferences which 'ought' significantly to influence group evaluations and those unrecognized vague discriminations which 'ought' not to bear significant weight in group evaluation. If it is not to be of even the same order of magnitude as the preference intensity chosen to represent the unit of measurement, then: (1) marginal preference is superfluous in the formulation; and (2) the chosen unit is completely arbitrary and bears no externally persuasive justification for its use like that of marginal preference.

If it be deemed desirable to salvage the concept of marginal preference as providing the appropriate unit of measurement, then it would seem that this can be done (while retaining Assumption (6)) only by adopting one or both of the following assumptions:

Assumption 4. Preference intensities are discontinuous at marginal preference.

Assumption 5. The weight w^i, which expresses the influence of a preference intensity by some individual i on the group welfare variation, differs when the preference intensity is less than marginal preference from when it is greater than or equal to marginal preference.

When we accept either one or both of these assumptions, it can be shown[1] that Armstrong's index requires for its derivation a still further set of assumptions. Of the two presented here, Assumption 5 appears the more practicable, since on the basis of contemporary methods of psychological scaling, no convincing empirical evidence can be adduced to suggest the lack of continuity of preference intensities (or even, for that matter, to suggest the *presence* of continuity).

On the other hand, differential weights for marginal and intra-marginal preferences would seem to have the same kind of justification as the very determination to use marginal preference as an experiential cut-off point.

[1] I shall attempt to show this below.

It might here be suggested that the assumption of transitive indifference in orthodox preference analysis is tantamount to setting the weights w equal to zero for all preference intensities less than marginal preference, when constructing a group scale, while setting finite values for the w^i's where intensities are equal to or greater than marginal preference.

Indeed, at this point it seems that the requirements for a 'determinate' group-welfare index conflict somewhat with the emphasis that Armstrong places elsewhere on the intransitivity of indifference. Although it is not the intra-marginal preference intensities themselves which are here deemed trivial, their influence on group welfare *is* deemed trivial, which in effect comes close to the same thing. Apparently the chief difference in emphasis remaining, then, between Armstrong's formula and that of orthodox preference theory is that group welfare under the latter is treated as varying continuously while under the former as varying discontinuously by finite steps.[1]

Adoption of my Assumption 5 leads to a *discontinuous* non-linear group-welfare variation function which unfortunately possesses difficulties that would not be encountered with continuous non-linear functions. For example, the operation of addition cannot be conveniently defined for the function. Consider the following arithmetic example:

(*a*) Define the group-welfare variation function as the linear function $V = w^1P^1+w^2P^2$; $w^1 = 1$ if $P^1 \geqslant k^1$, $w^1 = \frac{1}{10}$ if $P^1 < k^1$; $w^2 = 1$ if $P^2 \geqslant k^2$, $w^2 = \frac{1}{10}$ if $P^2 < k^2$.

(*b*) Assume $k^1 = k^2 = 2$.

(*c*) $P^1_{BA} = P^1_{CB} = 1$, $P^2_{BA} = P^2_{CB} = 2$ $(P^1_{CA} = 2, P^2_{CA} = 4)$.

$$V_{BA} = \tfrac{1}{10}\times 1+1\times 2 = 2\tfrac{1}{10}$$

$$V_{CB} = \tfrac{1}{10}\times 1+1\times 2 = 2\tfrac{1}{10}$$

So $V_{BA}+V_{CB} = 4\frac{2}{10}$.

By direct computation of V_{CA},

$$V_{CA} = 1\times 2+1\times 4 = 6.$$

Since it seems reasonable to define $P^i_{BA}+P^i_{CB} \equiv P^i_{CA}$, one might also expect that $V^i_{BA}+V^i_{CB} = V^i_{CA}$ and $V_{CA} = V_{BA}+V_{CB}$. But the discontinuity in the coefficients results in $V_{BA}+V_{CB} \neq V_{CA}$.

The same difficulty applies to subtraction, multiplication, and division.[2]

[1] This characteristic of marginal preference makes it not unlike the modern physical concept of the quantum. It might be suggested that this interpretation of the group-welfare function, including Armstrong's Assumption 6, is of the form described in the appendix to my article as a variant of Type I (isolation of each welfare level rather than of each alternative of choice).

[2] The argument applies as well to the general case $V = f\left(\sum_1^m w^iP^i\right)$, except in the trivial instance where $dV = 0$.

Now the important consequence of admitting my Assumption 5 into Armstrong's axiom system is that it *lessens* the determinateness of the group index unless an additional set of assumptions is introduced.

From (2) above we obtain the following conditions that have to be satisfied:

$$\left.\begin{aligned} \hat{w}^i\hat{P}^i &< w^iP_0^i \\ \hat{w}^j\hat{P}^j &< w^iP_0^i \end{aligned}\right\} \quad \text{for all } i, j, \text{ including } i = j \tag{8}$$

where $\hat{P}^i$ is any preference intensity less than marginal preference, $\hat{w}^i$ the weight appropriate to any $\hat{P}^i$; $P_0^i = k^j$, and w^j is a weight appropriate to P_0^i.

Since in (8) $\hat{w}^i \neq w^i$ for all $i = 1,\ldots, m$, the general solution here is *not* $w^iP_0^i = w^jP_0^i$!

All we can say now is that the conditions assert that

$$\left.\begin{aligned} w^iP_0^i &> \hat{w}^i\hat{P}^i < w^jP_0^i \\ \text{and} \qquad w^iP_0^i &> \hat{w}^j\hat{P}^j < w^jP_0^i \end{aligned}\right\}. \tag{9}$$

It is reasonable that the coefficients $\hat{w}$ be determined such that

$$\left.\begin{aligned} \hat{w}^i\hat{P}^i &\leqslant g^i \\ \hat{w}^j\hat{P}^j &\leqslant g^j \end{aligned}\right\} \tag{10}$$

where g^i and g^j are constants specified only as being less than or equal to some other numbers, respectively. Substituting (10) into (9) and rearranging terms, we obtain

$$\left.\begin{aligned} g^i &< w^iP_0^i > g^j \\ g^i &< w^jP_0^i > g^j \end{aligned}\right\}. \tag{11}$$

Consequently,

$$w^iP_0^i \gtrless w^jP_0^i \quad \text{for all } i \neq j. \tag{12}$$

$w^iP_0^i$ and $w^jP_0^i$ can diverge from one another only to the extent that g^i and g^j diverge from $w^iP_0^i$ and $w^jP_0^i$ respectively. In particular, in the case of a continuous group function,

$$\lim_{\hat{P}^i \to P_0^i} g^i = w^iP_0^i \quad \text{for all } i = 1,\ldots, m, \tag{13}$$

and therefore at the limit

$$P^i = P_0^i \text{ and } P^j = P_0^i \qquad w^iP_0^i = w^jP_0^i.$$

But the greatest divergence is possible where the g^i's are small. And this is exactly what is envisaged by Armstrong's Assumption (6).

Now, given

$$V = \sum_{i=1}^{m} w^iP^i + \sum_{i=1}^{m} \hat{w}^i\hat{P}^i, \tag{14}$$

we may assert that we possess a determinate group-welfare variation index if, and only if, for every V_{BA} and V_{DC}, we can decide either $V_{BA} > V_{DC}$,

$V_{BA} < V_{DC}$, or $V_{BA} = V_{DC}$. Armstrong claims this is possible if we know only all the P^i_{BA}'s and P^i_{DC}'s,[1] and k^i's—*and without having to know also the particular w^i's*! This follows because Armstrong's belief that marginal preference for each individual has the same group-welfare variation effect enables him to *deduce* all the w^i's from the k^i's alone. Thus, for example, if $k^1 = 6$ and $k^2 = 3$, then $w^2 = 2w^1$, since $w^1k^1 = w^2k^2$. Armstrong need only arbitrarily specify a number for w^1—say 11—and he deduces that $w^2 = 22$.

However, by (12) $w^iP^i_0 \gtreqless w^jP^j_0$, so we cannot deduce the w^i's from the k^i's alone. But then, as is evident from inspection of (13), we cannot generally compare V_{BA} with V_{DC}.

Our conclusion is that the group-welfare variation effects of individuals' welfare variations are similar only up to a linear transformation. So, without further information, no unique group index can be derived. A determinate group index can be derived, however, if we further specify the w^i's. If Armstrong can do this by empirical procedures alone, well and good.[2] If he cannot or does not[3]—then he apparently can derive a cardinal group-welfare index only by explicitly or implicitly assuming particular values for the w^i's.[4] This is exactly the position I took in my article:

> What was lacking was an additional assumption about the comparability of the marginal preferences of different individuals. Assumption (5) does not guarantee such comparability. Marginal preferences are not called on to affect group-welfare directly, but rather *through the welfare of individuals*. Only an additional explicit assumption as to interpersonal comparability of welfare changes can lead to Armstrong's numerical index.[5]

Armstrong cannot, then, deduce interpersonal comparisons of utility from his index.[6] Rather, he must assume interpersonal comparisons in order to deduce his index.

III

In his very useful 'Comment' Armstrong claims that the position I take in Part III of my article implies rejection of Assumption (5). I do not

[1] These are to be calculated, according to Armstrong, by empirical observation.

[2] The author has discussed the problem of empirical specification in 'Existence Conditions for a Social Welfare Function', *The Journal of Political Economy* (Aug. 1953).

[3] He does not appear to in his paper.

[4] A *cardinal* index of group-welfare levels, whereby welfare *variations* can be compared, is derivable from a *determinate* group-welfare variation index. For a discussion of this kind of derivation, in the case of individual welfare (utility) and welfare variation (preference intensity) indexes, see my article, 'Marginal Preference and the Theory of Welfare', Part II.

[5] 'Marginal Preference', p. 20. I admit that my symbolic example did not fully make this position clear.

[6] And, of course, interpersonal comparisons of utility are not implied by the ordinal postulational system through Assumption (5).

believe it does. I accept Assumption (5) within the context of the assumptions of ordinal preference theory;[1] and I would accept it even under a set of assumptions by which a measurable unit of preference intensity could be calculated, thereby enabling derivation of a cardinal utility index. I reject, not Assumption (5), but marginal preference as an appropriate unit for measuring preference intensity. I question whether the concept of marginal preference can support the edifice for which Armstrong intends it. I believe his use of the concept implicitly assumes a pattern of consumer behaviour which we do not in fact see fulfilled.

Armstrong intends the concept of marginal preference to support a formulation of cardinal utility. The logical dependence I have described in Part II above. The philosophic or psychological justification appears to me essentially contained in the following passage from Armstrong's 'Comment':

> *Surely an individual is as well off as he thinks he is and that is all there is to it.* A marginal preference is, therefore, an absolute standard for an individual of welfare-difference, and it matters not what analysis we make as to how such preference is supposed to arise from some combination of 'objects presented for discrimination' and 'discrimination between them'. . . . A marginal preference can be used as standard both for welfare-difference and utility-difference . . . since the point of reference for a theory of choice or a theory of welfare is where indifference ends and preference begins. . . . If an individual's tastes change . . . a marginal preference will continue to indicate the same welfare-difference. . . . And I cannot doubt that a marginal preference has just the same significance to other persons as to me. I do not need to show that marginal preferences are invariant in passing from mind to mind.[2]

The crux of the justification is apparently that a person is as well off as he thinks he is. Now, of course, modern psychology teaches us that this assertion is by no means as persuasive as it must once have been. Yet one may—at least provisionally—accept it and still ask—and this is what I essentially did in my article—how can one *measure* how well off a person thinks he is? Certainly in comparing two situations, A and B, an individual can tell under which he would be better off. But can he unambiguously say, for example, he is five marginal preferences better off under B than under A?[3] What would such a declaration mean? I suggest in my paper that it would *not* mean a preference intensity five times as great as a certain constant observable intensity. It would not, indeed, mean a particular preference intensity at all!

[1] Since perceptible welfare variations are assumed to be continuous—i.e. all positive preference intensities are discernible; and thus indifference is transitive—Assumption (5) asserts only that a positive or negative variation in group welfare can never come about solely as a result of some individual's shift giving rise to indifference, but can—although it need not!—come about as a result of some individual's shift giving rise to preference. This assertion is obviously a theorem deducible from the ordinal preference postulates. As such it *is* 'apparently innocuous'.

[2] Armstrong, pp. 11–12.

[3] This is the very core of Armstrong's claim.

A first problem is one of operationally defining marginal preference between any two alternatives. Armstrong's discussion suggests a procedure whereby a single choice decision between the two stimuli would suffice to establish marginal preference. Modern psychological experience in scaling suggests that such a procedure—because of necessarily operating close to the subjects' perceptual thresholds—would be subject to wide inconsistencies and ought at least to be supplemented by stochastic considerations, according to which marginal preference is defined as preference expressed in a certain percentage of the total choosing situations.[1] But this would have the effect of making marginal preference dependent on arbitrary labelling by the experimenter (the choice of the percentage of preference responses) rather than on a 'flash of recognition' by the subject, and would consequently no longer fit Armstrong's justification: 'An individual is as well off as he *thinks* he is'.

Even if this philosophic difficulty were not involved, the use of a stochastic definition with techniques similar to those now in use in psychological scaling would not generate an invariant marginal preference for an individual. Say 75 per cent. were chosen as the cut-off point. A certain individual prefers A to B 75 per cent. of the time; and he prefers C to D 75 per cent. of the time. Armstrong would seem to require—if he accepted this kind of definition of marginal preference—that the preference intensity for A over B equalled the intensity for C over D. It is known, however, from work with the psychologist Thurstone's *Law of Comparative Judgement*, that equally often noticed 'differences' are not always equal. 'Two pairs of stimuli having two unequal scale separations between the members of the pairs might still give equal proportions of judgements or two pairs having equal scale separations might give unequal proportions.'[2] The inequality stems from differences in the individual's ability to evaluate his feelings about different alternatives. He is surer (i.e. in the technical terminology, has a smaller 'discriminal dispersion') about some alternatives than about others.[3]

The same principle holds for non-stochastic definitions of marginal preference as well. Here, its overt consequence is very similar to the

[1] 'Situations' here is not to be confused with the term 'situation' as used above, referring to an 'object of choice'—a choice alternative.

[2] J. P. Guilford, *Psychometric Methods* (New York: McGraw Hill, 1936), p. 224.

[3] This point rather interestingly suggests that ordinal choices may arise from basically cardinal evaluations rather than the reverse. Thus, a person hesitant about whether he prefers A to B may empirically be frequently found to be uncertain because he 'doesn't know exactly how he feels about A' or 'doesn't know exactly how he feels about B', rather than that 'he doesn't know how he feels about A vs. B'. He will thus be behaving as though he had a metric evaluative continuum on to which he arrayed the alternatives of choice and from which read off their preference order.

This point is not entirely consistent with the emphasis in my article on the separate perceptual structuring of each choice situation. See below for further discussion of this.

illustration I presented in my paper where an individual may marginally prefer A to B and C to B, yet marginally prefer A to C.

An example of the kind of evidence which makes us unsure that marginal preference, however defined, measures some fixed thing is the following account of a psychological experiment carried on in 1911 by E. K. Strong.

> Strong had asked 25 students to arrange 50 advertisements in piles at 'just noticeable intervals' in order of merit without specifying the number of piles. The number of piles ranged from 6 to 37. Each subject was then told to give a numerical value to each pile in a scale from 0 to 100. The distribution of the assigned scores approximated the normal form in spite of the fact that a sorting according to equal-appearing intervals had been the original aim.[1]

In addition to the problem of defining the marginal preference between two alternatives so as to know what is being measured, there is the problem of knowing what is being measured when one scales two alternatives separated by more than marginal preference. In Armstrong's treatment this boils down to finding a chain of intermediate alternatives, each one marginally preferred to one predecessor and marginally preferred to by one successor. Let us assume that we have experimentally constructed such a chain between B and A (A preferred to B). What does it tell us?

First, because of the variance of marginal preference as a preference intensity over the relevant pairs of alternatives, the total preference intensity of a chain of n-marginal preferences will in general be different for each particular n-membered set. So in general, any notions about underlying preference intensities derived solely from comparisons between different marginal preference chains may be mistaken. If, now, the individual and group-welfare variation functions discussed in Part II above are to remain logically consistent in the face of this ambiguity, the preference-intensity continuum must be redefined in terms of marginal preference alone—so that 'distances' will now represent only multiples of marginal preference units and no longer refer to a more primary perceptual process. In this eventuality not much philosophic justification would seem to inhere in the welfare index.

But this leads to a further difficulty. Suppose we do redefine our continuum in terms of marginal preference. Now, we may select a second chain between A and B. Because we can expect that—whether formally introduced into the system or not—the underlying preference intensity represented by marginal preference will differ from alternative pair to pair, then we may also expect that the total preference intensity represented by one particular n-membered marginal preference chain between A and B can be equalled by a second chain having a different number of links. Consequently we obtain a different individual welfare variation

[1] Quoted in Guilford, op. cit., pp. 258–9.

value for the movement from B to A depending on which of a large number of intermediate chains we choose—our individual index is indeterminate.

So far we have assumed that at least the 'real' preference intensity between A and B is unchanged for the different possible comparison paths. But even this is questionable in view of the importance of a frame of reference in each choice situation. In my article I noted that the level of discernment in each situation (especially in view of the multiple dimensions of each choice alternative) depends upon motivation, relevant past experience, &c. Since our experimental procedure involves selection of particular sets of alternatives for presentation, it may be extremely difficult—if not unfeasible—to attempt to isolate the choosing behaviour of the subjects from the special evaluative context established by the particular selection presented. The measurement procedures necessary to calculate marginal preference chains will themselves affect how the subject perceives a given choice situation. So we might well expect to find, if we could measure the underlying preference intensity of each link in one marginal preference chain between A and B, that the sum of these intensities differed from the analogous sum for a different chain between the same A and B.[1]

What, then, are we measuring when we bridge the preference distance between A and B with a chain of marginal preferences? In terms of marginal preference units, we may obtain different scale values for different chains; and if we possess an underlying psycho-physical preference intensity continuum, we do better to measure intensities without marginal preference as intermediary: the attempt to make such measurements by

[1] As to the dependence of evaluative behaviour on a context of relevant experience: 'Scale values would seem to be altered owing to the mere presence of other stimuli. . . . The stimuli have one psychological value when seen alone or in one context and a different value when seen in another context' (Guilford, pp. 257–8). Certainly, as Armstrong clearly notes in his 'Comment', this kind of consideration may in some cases lead to 'inconsistent' behaviour—i.e. intransitivity of *preference*.

A paper read by Kenneth O. May at the Dec. 1952 meeting of the Econometric Society in Chicago, 'The Intransitivity of Individual Preferences', stresses the likelihood of preference intransitivity when the alternatives of choice have many—heterogeneous—dimensions. And the following, again from Guilford, may be suggestive: 'The writer attempted to evaluate the degree of introversion or extroversion of the reaction to items of a typical questionnaire. Scale separations could be found between every item and every other one, but after the final average scale differences were obtained, the discrepancies between them and the experimentally determined scale separations were entirely too large. The reason is, of course, that the individual scale separations between pairs of items do not lie along the same linear continuum. The test items represented several different dimensions of personality' (p. 241).

Sketchy empirical evidence does not lead us to expect widespread actual intransitivity of preference. But the considerations presented here suggest that it may be foolhardy to expect unambiguous stable cardinal utility functions of the kind interpreted by Armstrong. 'Near-intransitivity' of preference is far more damaging to assumptions about determinate preference intensities than to assumptions about determinate preference orders. Thus, Armstrong's formulation and ordinal preference theory do *not* stand or fall together on my criticism, as Armstrong would have us believe.

stretching out a marginal preference chain may give rise to different values on even this underlying scale for different chains.

I am suggesting here, as in my article, that when we construct a cardinal utility or welfare index for an individual on the basis of a marginal preference unit of measurement, we do not really know what we are measuring—whether or not we conceptualize an underlying preference intensity continuum! Certainly this assertion is relevant to the usefulness of Armstrong's system.[1]

If our individual indices are so significantly ambiguous, then our group index can be no less ambiguous. Moreover, the additional set of assumptions which must be incorporated into the postulational system to deduce Armstrong's conclusions is, considering the material of this section, a value judgement which by no means calls for indubitable assent.

Given the group of persons studied in Strong's experiment described above, for example, is it at all obvious that we should desire to give the same weight in the group index to the 'marginal preference' of the individual who distinguished the stimuli into thirty-seven intervals as to the marginal preference of the individual who distinguished the same stimuli into only six intervals?

[1] In the same manner as with Part I of this paper, my argument in this section does not claim that Armstrong's index would be ambiguous with all logically possible specifications of measurement procedure, but that it does seem ambiguous with those currently available procedures which Armstrong's discussion and the author's own familiarity appear to make appropriate. I welcome a description of alternative procedures which, given modern findings in the field of psychological scaling, would render an unambiguous index based on 'marginal preference'.

AMHERST COLLEGE

THE MACMILLAN GAP 1931–53

By RAYMOND FROST

THE Macmillan Committee drew attention in a single paragraph of its report[1] to the special difficulty of raising long-term capital for home industry 'in amounts', as the report put it, 'not sufficiently large for a public issue'. This way of defining the problem is significant of the institutional circumstances of the time. The committee accepted that a public issue was the normal way of raising finance for industry, and it was by comparison with the ease of floating a large issue that they recognized the difficulty of marketing a small one. It is unlikely that a similar committee, sitting in 1890 or 1913, would have drawn attention to the matter in this way—if indeed it had bothered to do so at all—because up to 1913 industry had normally been able to find adequate outside finance without recourse to the issue of quoted securities upon the Stock Exchange. But during the 1920's the issue of marketable securities by industry had been undertaken on an unprecedented scale. The Macmillan Committee was sitting at a time when this vogue had reached its peak, and though its analysis of the problem is not obsolete in its broad outlines, it is not perhaps phrased in terms that are appropriate to current conditions. A good many changes have taken place in the City and in industry since 1931, and it is the purpose of this article to set the committee's analysis in the context of its time and then to examine it in the light of developments which have since taken place.

The committee's definition of the problem

The committee postulated the existence of the Gap in 300 words. It is one of the milder ironies of economic history that of the committee's many and weighty recommendations, its brief proposal for the establishment of an institution to finance the smaller business should have been one of the few to have been carried out, while only its authorship of the Gap keeps its name alive—and quite vigorously alive—in the City today. The proposal was outlined in the following words:

> It has been represented to us that great difficulty is experienced by the smaller and medium sized businesses in raising the capital which they may from time to time require even when the security offered is perfectly sound. To provide adequate machinery for raising long dated capital in amounts not sufficiently large for a public issue, i.e. amounts ranging from small sums up to, say, £200,000[2] or more, always presents difficulties. The expense of a public issue is too great in proportion to the

[1] *The Report of the Committee on Finance and Industry*, June 1931, Cmd. 3897, para. 404.

[2] The committee evidently had the London Stock Exchange in mind, because it is possible to float issues of amounts as low as £40/£50,000 upon the provincial Stock Exchanges. This article is also confined in its reference to the London Stock Exchange; provincial exchanges remain a field for research which might very well be worth investigation.

capital raised and therefore it is difficult to interest the ordinary investor by the usual method; the investment trust companies do not look with any favour on small issues which would have no free market and would require closely watching; nor can any issuing house tie up its funds in long-dated capital issues of which it cannot dispose . . . as we do not think that they could be handled by a large concern [*i.e. financial institution*][1] the only other alternative would be to form a company to devote itself particularly to the smaller industrial and commercial issues. . . . We see no reason why with proper management and provided British industry in general is profitable, such a concern should not succeed.[2]

The emphasis on the difficulty of raising capital except by the use of quoted securities is unmistakable. The paragraph touches briefly on the obstacles to making a market in a small quoted issue; they are analogous to those which stand in the way of dealing in a small amount of any commodity in a market in which the ready negotiability is highly prized. It may be worth while to fill out the committee's brief analysis with a fuller explanation of the matter.

The difficulty of making a market in a small industrial issue

A small industrial issue fails to meet the main conditions required to make a good market in any commodity—that it should be easy to identify and to supply in such quantities as may be required. The identification of a small issue presents formidable difficulties to the investing public. At 31 March 1953 there were 7,444 non-financial issues quoted on the Stock Exchange Official List.[3] The ordinary investor cannot possibly investigate and weigh the merits of all these issues. His choice must be guided

[1] This is my own insertion.

[2] *Report*, para. 404. The advantage of size in the capital market is a serious obstacle to competition, for it implies that the allocation of finance for future development is not solely determined according to the most profitable of its alternative employments; the advantage of size obscures the criterion of efficiency, thereby distorting capital development away from the optimum pattern. This is the rational justification for the committee's concern that sound and credit-worthy businesses should be excluded from the normal source of capital because of their inability to make a public issue.

[3] This total is made up as follows:

Breweries and distilleries	548
Canals and docks	30
Commercial, industrial, &c.	4,602
Electric lighting and power	60
Gas	25
Iron, coal, and steel	244
Mines	465
Nitrate	4
Oil	58
Railways	148
Rubber	487
Shipping	90
Tea and coffee	296
Telegraphs and telephones	27
Tramways and omnibus	87
Waterworks	273
	7,444

primarily by reputation, which implies that it will fall upon big companies with names that are household words and which are believed, with or without good reason, to be reliable, sound, and enduring. Amongst the bewildering variety of securities upon the Stock Exchange, the unprofessional private investor is in a position similar to that of an Australian aborigine who might by some chance stray into the Caledonian Market. Secondly, if the amount of an issue is small, an easy and adequate supply cannot be maintained. With an issue of 10 million shares, 200,000 or 300,000 will change hands every account. Consequently it is possible to buy or sell 5,000 or 10,000 without significantly affecting the price. But if the total size of the issue is only 200,000 shares, a demand for 10,000 shares may be more than the market can supply without a large increase in price, while a sale of this amount might only be made at a ruinous sacrifice. These inevitable difficulties have the consequence that, as the report pointed out, 'the expense of a public issue is too great in proportion to the capital raised'.[1] Investors are deterred from purchasing shares in a small issue by their lack of ready negotiability; consequently the shares must be offered at a yield which is sufficiently high to compensate for this as well as for trading risk—which implies that the small company has to pay that much more for its money. Specific costs of issue—underwriting, &c.—are also higher per unit issued when the total size of the issue is small owing to the element of fixed overhead expenses in the market's organization. Furthermore, to ensure success, the issuing house frequently puts the issue price a good deal lower than eventually turns out to have been necessary, thus creating a wide differential between the price received by the company and the price to which the shares may go shortly after the issue. The issuing house makes what is perhaps disproportionately large profit, which is rather the reward of its superior bargaining power *vis-à-vis* the small company than for the true risk involved. This is frequently the largest single item of issuing expenses in the case of offers for sale, placings, and introductions (as opposed to direct public issues).[2]

[1] *Report*, para. 404.

[2] The table below is taken from Table 14, p. 121, of R. F. Henderson's *The New Issue Market*.

Costs of issue expressed as a percentage of amount paid by the investing public

Method of issue	*No. of issues*	*Average size*	*Cost*
	SMALL ISSUES		
		£	%
Placings . . .	60	198,000	24
Offers and public issues .	24	212,000	11·5
	LARGE ISSUES		
Placings . . .	5	636,000	9
Offers and public issues .	5	826,000	7·6

The development and decline of investors' preference for quoted industrial issues

It is a commonplace that from the beginning of the industrial revolution to the end of the nineteenth century British industry developed with but negligible assistance from the City. As the Macmillan Report put it:[1]

> Industry in those days was, so far as each unit was concerned, on a comparatively small scale; its basis was in the main a family basis, as the names of many of the great English businesses still show; its capital was provided privately and it was built up and extended out of profits; insofar as it required banking facilities, it found them from the independent banks, often family banks, which in general had their headquarters in the provinces, and particularly in the Midlands and the North, where the new industries flourished. Moreover, there had existed for many years in this country a large class of investors with means to invest, who exercised an independent judgment as to what to invest in, and did not rely as in some countries entirely on their bankers.

In these circumstances industry could raise capital without recourse to the market, and without submitting to the market's condition that the means by which money was raised should be a negotiable security. Investors were willing to lock up their money in local enterprises, in full knowledge of the reputation and ability of the entrepreneur. But a willingness to undertake an investment with no ready escape requires more than knowledge; it requires confidence in the future. Such confidence the Victorians possessed; they had an implicit belief in the permanence of things. But after the first world war conditions changed, and with them the state of mind of the investing public. Confidence was shaken, and it was small wonder that investors should have developed a preference for investments of which they could readily dispose. It is likely that the vogue for quoted industrial issues was introduced to the investing public on an unprecedented scale by the post-war wave of floatations of private companies which had grown in size and prosperity on war-time profits, and from which their proprietors wished to take a capital gain as a result of the war-time increases in personal taxation.[2] But whatever the influences which started the fashion, the public was ripe for it. If it was quoted, investors would buy it. The 1920's were the background for some of the classic episodes of company promotion. While the proportion of highly speculative issues may not have been larger than in pre-war periods, the sheer scale on which the issue of quoted industrial securities was made drew attention to practices which had gone unchecked for decades, and the twenties closed with a revision of company law. The thirties opened with a considerable tightening of the Stock Exchange Council's control over industrial issues, and closed with the passage of the Prevention of Fraud (Investments) Act.

[1] Para. 377.

[2] Surtax rose from a maximum rate of 6*d*. in 1913 to 6*s*. in 1920.

The figures below show the growth of industrial issues outstanding.

Stock Exchange Official List:
'Commercial, Industrial' Securities

Year	*Nominal amount of securities outstanding*
	£ million
1913	438·6
1933	1,215·6

This cannot be accounted for by normal industrial growth. During the 1920's capital formation in the electricity, motor-car, rayon, and consumer goods industries must have been offset to a considerable extent by capital wastage in the textile and heavy engineering industries.[1] The figures in this table can only be accounted for by a change of taste amongst the investing public against unquoted and in favour of quoted securities. The rate of increase which they indicate in the amount of quoted industrial issues was not maintained in the succeeding period of 20 years after 1933. Unfortunately the character of Stock Exchange statistics makes it impossible to support this statement by a simple comparison. The figures require a good deal of interpretation, which accounts for the length of the passage that follows; it will be shown that they indicate a decline in the rate of issue of new quoted industrial securities.[2]

Statistics for quoted industrial securities

The basis on which the Stock Exchange compiled its statistics was changed in 1948 in such a way as to prevent a direct comparison between the figures in 1933 and in 1953. Up to 1938 the only aggregate figures for securities outstanding were for those in the Official List. In 1939 separate figures for the Supplementary List—being securities less frequently dealt in—were also collected. In 1948 the two lists were amalgamated and the Supplementary List disappeared. Thus the comparison between 1913 and 1933 can be made only for securities in the Official List. To compare 1933 and 1953 some allowance must be made for the amount of securities which would have been in the Supplementary List had the total for that list been

[1] Furthermore, the extent to which the new industries relied on outside finance through the issue of quoted securities would seem to have been limited. See footnote 2, p. 178, of Mr. T. Balogh's *Studies in Financial Organisation*.

[2] I am indebted to Lord Piercy, Chairman of the Industrial and Commercial Finance Corporation, for the idea of using Stock Exchange statistics to illustrate the discussion of the Macmillan Gap.

published at all in 1933, or had it been published separately in 1953.[1] It is possible to estimate what the extent of this allowance should be. We know the separate totals of the Supplementary and Official List for one pre-war year, 1939, and for three post-war years, 1945–7.

	Nominal amount of securities outstanding in the 'Commercial, Industrial' section of		
	A *The Official List*	*B* *The Supplementary List*	*B/A* %
	£ million	£ million	
1939	1,279·5	356·9	27·9
1945	1,283·5	311·3	24·2
1946	1,218·0	351·1	28·8
1947	1,312·0	413·6	31·5

It is reasonable to assume that the nominal amount of securities in the Supplementary List of 1933 would have amounted to between 25 and 33⅓ per cent. of the nominal amount in the Official List. Thus, if we deduct this proportion from the nominal amount of securities outstanding in the Official List for 1953, we get a figure that is comparable with the Official List figure for 1933.

Nominal amount of securities outstanding in the 'Commercial, Industrial' Section of the Stock Exchange Official List

	£ million
1913 . . .	438·6
1933 . . .	1,215·6
1939 . . .	1,279·5
1947 . . .	1,312·0
1953 (estimated) .	1,663·7 (on 33⅓% ddctd.)
	1,871·7 (on 25% ddctd.)

The percentage increase in the nominal amount of industrials outstanding was therefore 177 per cent. in the 20 years after 1913 and between 37 and 54 per cent. in the 20 years after 1933. It may be said, however, that there has been a rapid increase since the war in the amount of industrial securities outstanding, which would indicate a revival of interest in marketable securities. But these figures are misleading, for what they conceal is that this increase is primarily the result of a lower rate of retirement of existing

[1] It would be possible to find the total amount of the securities in the Supplementary List in 1933 by adding up the individual items, of which there would probably be 1,500 in the Commercial and Industrial Section with which we are concerned. But not only was there no separate total for the Supplementary List in 1953, but also the individual securities, which would formerly have gone into the Supplementary List, are merged with the Official List. Consequently, the extremely tedious business of compiling a total for the Supplementary List of 1933 would not be worth while as there is no way of getting a comparable figure for 1953.

securities rather than of a revival of the vogue for quoted issues. The amount of quoted industrial securities outstanding at the end of any year is the amount at the beginning, minus repayments and retirements during the year of existing securities, plus the amount of new securities for which permission to deal has been granted during the year. Once again the statistics require a good deal of interpretation. No separate figures have been compiled before 1935 for applications granted in the 'Commercial, Industrial' Section for permission to deal, while those compiled since 1935 do not show whether the securities are allocated to the Official or to the Supplementary List—which presents difficulties for the years up to 1939, when the only statistics were for the Official List.

'Commercial, Industrial' Securities

	Nominal amount of applications granted for permission to deal	*Nominal amount of securities outstanding. Official List only*
	£ million	£ million
1934	..	1,212·9
1935	100·1	..
1936	101·8	..
1937	266·7	..
1938	101·4	..
1939	56·7	1,279·5
	626·7	+ 66·6
		Official and Supplementary List combined
1948	..	1,788·7
1949	124·5	..
1950	137·5	..
1951	157·0	..
1952	196·0	..
1953	214·0	2,495·5
Total for years 1949–53	829·0	+ 706·8

Assuming that all the applications for permission to deal were granted for the Official List, the amount retired in the 5 years 1935–9 was £560 million against £122·2 million in the 5 years 1949–53. The high pre-war rate of retirement squares with what we know of economic conditions at the time, and their effects on companies' capital structures through capital reductions, &c. The comparison is striking even if it is assumed that a large proportion of the applications granted in 1935–8 would not appear in the statistics of securities outstanding because they were allocated to the Supplementary List. But we know that the total amount of securities in the Supplementary List was only £356·9 million in 1939, the first year for which separate statistics for this list were compiled. It would be absurd

to assume that this amount was solely the result of applications granted since 1935. But even if one does, the figures still indicate a higher rate of retirement before the war than today:

'Commercial, Industrial' Securities

	£ million
Nominal amount of applications granted 1935–9	626·7
Deduct total nominal amount in Supplementary List at 1939	356·9
	269·8
Deduct increase in nominal amount outstanding in Official List 1935–9	66·6
Estimated amount of securities retired 1935–9	203·2
Nominal amount of applications granted 1949–53	829·0
Deduct increase in amount of securities outstanding 1949–53	706·8
Amount of securities retired 1949–53	122·2

Thus, on the most extreme assumption, which must greatly underrate pre-war retirements, the post-war rate of retirement is still lower. In other words, the post-war increase in the amount of industrial securities outstanding is rather an indication of the prosperity of industry than of an increased use of marketable securities by industry. Against this it may be argued that the amount of applications granted in the post-war years is larger than in the five pre-war years for which we possess figures and would have been larger still but for government restrictions upon capital development and upon the issue of bonus shares. But issues made before the war in capitalization of reserves were also restricted, not by controls, but by the lack of profits out of which reserves could be made at all. After the slump there was not a great deal left to capitalize.

In the absence of statistics of applications rejected by the Capital Issues Committee, the effect of control over issues for cash cannot be accurately assessed. But it cannot have been more than marginal during the post-war years, for the following reasons:

1. The committee's powers of coercion are vague and it has never actually brought anyone to Court. The exercise of its powers has been kept well within the limits of what business is prepared to tolerate. The committee's decisions have only aroused hostility over the treatment of bonus issues during the years when the government regarded them with extreme disfavour, and over issues for cash by financial enterprises such as investment trusts and hire-purchase finance companies, which were under an absolute Treasury ban.
2. It is true that control over the raising of capital by industry has been exercised at an earlier stage by the department's restriction of the issue of building licences. This must have made a considerable difference to the amount of finance raised for projects involving building.

Issues required to provide finance for working capital were not restricted to any marked extent, except at times of severe crisis and with respect to the less essential industries, and they normally make up at least 50 per cent. of total long-term issues for cash. Consequently, even if issues required to finance projects involving building had been cut down by half as the result of government control—which seems unlikely—the net effect of controls would have been to reduce the total of issues for cash by only 25 per cent. of what they would otherwise have amounted to.

3. Issues representing the floatation of existing private companies are subject to hardly any restriction.[1] Owing particularly to the incidence of death duties upon shareholders in private companies, there was a spate of such issues after the war. During 1945 and 1947 they made up 89 per cent. of the total *number* of quoted issues compared with 22 per cent. in 1937.[2] Since what we are considering is not the amount of money raised by industry, but the effect of controls on the amount of quoted issues made after, as compared with before the war, this comparison is most relevant.
4. From the beginning of 1952 control over building licences and over bonus issues has been progressively relaxed; by 1953 such control can have had very little effect on the amount of securities issued.

It is therefore unlikely that government control was responsible, to a more than marginal extent, for the slower rate of growth since the end of the war in the amount of quoted securities issued by industry.

The development since 1945 of a new market for unquoted industrial issues

Reasons have been mentioned for believing that the development during the 1920's of a large-scale market for quoted industrials was the result of a change in the taste of the investing public away from unquoted and in favour of quoted issues, and that this created the Macmillan Gap. The subsequent fall in the activity of the market for new quoted industrial issues, and in particular its failure to reflect the prosperity and capital growth of the 1940's and 1950's do not by themselves indicate that investors' tastes have swung back to unquoted issues—which would tend to close the Gap. This is not a question which can be answered one way or the other by statistics; no separate figures for unquoted issues are compiled by any agency so far as I am aware.[3] But there are certain

[1] R. F. Henderson, *The New Issue Market*, pp. 137–8.
[2] Ibid., p. 139.
[3] Unquoted issues are either sold privately to individuals or placed privately—the technical term used—with institutions.

unmistakable indications that a market for unquoted issues has grown up since the end of the war on a scale that is certainly without precedent within the last 40 years. Even large public companies, with access to the market for quoted issues, have chosen to place privately issues of considerable size. Imperial Chemical Industries, for example, has placed a debenture issue of £20 million with a number of institutions. It is a new characteristic of the City today that this market for unquoted issues exists —and it exists amongst the institutions. The reason is that the life-assurance companies and large industrial organizations with the pension funds which have come to command a dominant position amongst the private sources of new investable funds, are willing to invest in unquoted loans and preference shares.

Since 1945 the life-assurance companies have greatly increased the scale of their activity in this market.

*Total of Selected Long-term Investments of Life-Assurance Companies**

	1913	*1933*	*1937*	*1948*	*1951*
			£ million		
British Government securities	5·3	286·2	357·6	1081·9	1082·6
Mortgages	113·8	175·5	188·9	186·3	307·6
Debentures	132·4	212·5	268·1	242·8	360·9
Preference and Guaranteed .	30·6	85·9	137·5	216·0	256·2
Ordinary	18·4	87·5	162·5	292·8	391·8

* From annual return of life-assurance companies to Board of Trade. 1938 was the last pre-war, 1949 the first post-war year, of publication by H.M.S.O. (referring to calendar years 1937 and 1948 respectively).

The growth in gilt-edged assets that was the result of war-time finance left the insurance companies with a portfolio that was excessively safe and insufficiently remunerative. Their new investments since 1945 have therefore tended to be more in the form of industrial than government securities, in order to restore something like the pre-war balance. There is reason to believe that this tendency has accelerated since 1951, the last year given in the table.[1] Further, a large part of the 'Mortgages' is represented by mortgages on industrial property, the proceeds of which have contributed to the finance of industry. The flow of insurance company funds towards industry may well slow down when a new equilibrium between gilt-edged and industrial assets has been reached, but even the demand for new industrials to replace the existing portfolio as it matures will ensure that the life-assurance companies remain a

[1] *The Banker*, Sept. 1953, p. 174.

considerable influence in the industrial capital market for a great many years to come.[1]

The investment behaviour of the insurance companies and pension funds is determined by the character of their business—the purpose for which they exist. They receive from their clients cash premium payments, and promise to pay in return at some future date a cash benefit of a larger amount than the total of premium payments. In addition, they have to cover their own running expenses. The only way they can do this is to invest the premiums. Their investments must be of high average safety, because they cannot afford to default on their obligations. They must also be readily convertible into cash at the dates when their obligations fall due. None of these conditions would imply any marked difference in investment behaviour from that of a very cautious individual private investor. But there is a further characteristic of life-assurance and pension business which does permit a very marked distinction in their investment behaviour from that of private individuals, and that is that the dates on which assurance obligations will fall due can be estimated according to actuarial calculations with considerable accuracy for many years ahead. Consequently, what the assurance companies require is not investments which can be converted into cash at *any time*, but which will become liquid in the appropriate amounts and at the dates when their obligations mature. They are therefore willing to invest in an unquoted security, provided that it is redeemable at a date which corresponds to the time structure of their obligations.[2] They are less willing to accept irredeemable securities, which implies that the standards which they apply when judging the merits of an irredeemable

[1] Savings by way of life assurance have more than kept pace with the growth of the national income, while other forms of personal savings have declined, or become negative.

	A *Total premium income of life-assurance companies established in the U.K. from ordinary and industrial business within the U.K.*	*B* *Aggregate personal income*	*A/B* %
	£ million	£ million	
1946	193·2	8,615	2·2
1947	218·5	9,234	2·4
1948	238·4	9,828	2·4
1949	253·5	10,416	2·4
1950	272·1	10,900	2·5
1951	298·2	11,855	2·5
Percentage increase 1946–51	54·3%	37·6%	

[2] This is a broad limitation on the term of their investments in general. The term of individual loans, particularly if the amount is not large, would be decided according to normal investment considerations of business prospects, and of the future course of interest rates. Whether the investment is redeemable is the important consideration; the pattern of future claims would allow, in the case of a large life-assurance fund, a considerable leeway in deciding the exact date of repayment.

security are higher than those which they would apply to an equivalent redeemable security. Ordinary shares are, of course, never redeemable, and in consequence only the very best class of equity is acceptable to the insurance companies.[1] It is the narrowness of the institutional market for ordinary shares which, now that the institutions have become the principal source of investable funds, is the cause of current discussions of a shortage of risk capital. Ranking lowest on the institutions' scale of preference is the security which is neither redeemable nor quoted. A quoted irredeemable security does at least have a ready market, though the price at which it might be sold at future dates is less certain than the price at which the issuing company contracts to repay a redeemable security. But a security which has no free market and no redemption date can hardly be regarded as liquid at any time, and it is consequently not entirely appropriate as an investment for an institution which has future claims to meet in cash. That is why the problem of finding a market for equity in private companies, particularly when they have to be sold to raise money for paying estate duty, has provoked the establishment of no less than three new institutions during 1953.[2] To sum up, while the post-war investment policy of the life-assurance companies has increased the supply of capital in the form of redeemable loans and preference shares, it has not met the full need for relatively cheap equity. It is unlikely that this need will ever be adequately met in a market which has become dominated by the institutions. There have been other major changes since 1931 in the conditions of the market which have a bearing on the problem of the Macmillan Gap.

The turning of investors' attention to investment at home

It is a recurrent pattern in the behaviour of British investors that they rediscover the advantages of investing at home after a crash in the world capital markets. During the 1930's the increase of interest amongst investors in home as opposed to foreign issues was sufficiently marked to call forth new institutions which aimed to promote smaller industrial issues. I do not intend to deal with these here, because their development up to the outbreak of the second world war has been ably described in Mr. T. Balogh's *Studies in Financial Organisation*,[3] while their development since

[1] The attitude of the life offices to ordinary shares is naturally influenced by their requirement of a high degree of safety in their investments. Ordinary shares are less safe than loans, which carry prior rights to repayment and fierce legal sanctions in the event of default. The life offices therefore tend to restrict their purchase of ordinary shares to those of the biggest and soundest companies. They will sometimes buy equities of the second class, but only at a price which will show a high dividend yield—7½ to 10%—with the dividend covered three or four times by earnings. This implies that the yield structure of the new issue market is such that even if it is possible to sell equities other than 'blue chips' it is an extremely expensive way of raising money and in many cases so expensive as to be an absolute deterrent.

[2] Estate Duties Investment Trust Ltd.; Safeguard Industrial Securities Ltd.; Private Enterprises Investment Co. Ltd.

[3] pp. 288–90, 299–308.

has been negligible owing to the Treasury ban on the raising of capital by investment houses, which was not lifted until the autumn of 1953. Mr. Balogh's analysis of their position and functions therefore holds good —except that their importance relative to the insurance companies and the new institutions has declined. But these pre-war institutions do not in the main tackle the problem of finding a home for unquoted securities. They are willing to finance for a few years companies which by growth or amalgamation would ripen to a size appropriate for a public issue. They are forcing-houses for potential market material. Their lack of capital prevents any other course of action, even if they wished to adopt it, for they have to turn over their invested funds fairly frequently in order to make adequate profits. There were also some efforts by government and the Bank to provide finance for industry. These have been described in Mr. Balogh's book[1] and there is no need to say anything about them here, except to remark that they were the beginnings of a new kind of self-conscious interference in the field of industrial finance. There has recently been a further development in the investment behaviour of established private institutions which is relevant to the problem of the Macmillan Gap. There are indications since the end of the war that the merchant banks have taken a new interest in the finance of private companies. It is impossible to estimate the extent of this because in most cases they publish no information at all about their activities. The funds they have provided may well be small. But it is a remarkable indication of the way the City's interest has turned from foreign to home investment that the princes of Edwardian international finance should take the trouble to purchase small holdings of unquoted shares in, for example, small industrial companies in the midlands. Towards the end of 1953 this trend crystallized with the formation of two institutions by merchant banks to purchase and hold ordinary shares in smaller companies.[2] Two other institutions were also established during 1953 with a similar purpose of purchasing equity in the smaller business, but confining their activities to purchases from shareholders in order to enable them to make provision for estate duty (i.e. as opposed to financing industrial development by the company itself). The first of these institutions, Estate Duties Investment Trust Ltd., is managed by ICFC; the other, Safeguard Industrial Securities Ltd., was formed under the sponsorship of an issuing house, The London and Yorkshire Trust. What is common to both these agencies is that their resources are to a large extent provided by subscriptions to their capital from insurance companies and investment trusts, which are normally

[1] *Studies in Financial Organisation*, pp. 302–8.

[2] Private Enterprises Investment Co., formed by a consortium of four merchant banks, and Lazard Securities, a subsidiary of Lazard Brothers.

unwilling to invest direct in unquoted equity (or equity which commands no ready market). The combination of investment management possessing experience of the smaller business with money from the large institutions may possibly be the start of a new supply of risk capital into the Macmillan Gap. It may, on the other hand, be a passing phase, which is the result of the lack of normal investment opportunities for the big institutions during 1952 and 1953. Needs of industry for industrial development and particularly for inventory finance declined during those years without a corresponding decline in the investable income of insurance companies in particular (because this income principally arises out of fixed contracts for premiums and fixed interest on safe investments).[1] But these doubts may well be unjustified; certainly the Estate Duties Investment Trust is intended to be a permanent contribution to the machinery of the City. The situation has clearly changed since 1931 to such an extent that the Macmillan Committee's criticism that 'in some respects the City is more highly organised to provide capital to foreign investors than to British industry' is hardly applicable today.

The expansion and cheapening of bank credit since 1931

The change in the state of credit that has taken place since 1931 should have contributed to an increase in the supply of finance for industry. Money was more expensive through the 'twenties than it became during the 1930's or than it is today. Bank credit has also become more accessible to industrial borrowers, as a result of a change in the composition of bank balance-sheets analogous to that described in the composition of life-assurance company assets. With the banks the stimulus to increased lending to industry has come from the increase since 1939 in the amount of their short-term lending to the government. Apart from the meretricious and temporary reduction of bank liquid assets in 1951, the demands of government have kept such assets well above the traditional minimum, with the result that the banks have every incentive to increase their less liquid, more risky, and more profitable advances to industry. In order to extend their business, and until something like the pre-war proportion of their assets is restored, they have granted what are in effect medium-term loans in the conventional form of overdrafts repayable on demand. This practice may well have gone some way to help the smaller business, though it is not a satisfactory substitute for long-term capital, owing to the bank's right to repayment at any time, and the uncertainty as to when that right will be exercised. It is not, therefore, strictly relevant to the problem of

[1] Owing to this it has become one of the characteristics of the capital market after as compared with before the war that fluctuations arise principally on the side of demand.

the Macmillan Gap, which is by definition the lack of long-term and permanent finance; but it is one of the post-war changes that are sufficiently marked to be worth mentioning.

The growth in the importance of retained profits as a source of finance for industry

The trend towards the retention by industry of an increasing proportion of profits was greatly accelerated after the second world war as the result of war-time and post-war government policies of dividend restraint, and of the increasing consciousness of management of its own powers in contrast to the importance of shareholders.[1] In view of this, it seems curious that complaints about the difficulty of finding money for capital development should be louder today than before the war. But there is no real contradiction between the statements that industry has been financing its development out of retained profits to a larger extent than before, and that the total of finance available to industry from interior and exterior sources has been from time to time insufficient to support the capital development that industry wished to undertake. Furthermore, the concerns with surplus funds are not necessarily those that wish to undertake capital development or have the opportunity to do so. And it is only to a limited extent that money is transferred from the static and liquid to the growing and undercapitalized concerns. When such transfers take place at all, it is generally through the channels described below, none of which are free from leaks and diversions through which the money may be lost to the finance of industry *en route*.

1. By repayment of debt, provided that the creditors reinvest the money in fresh industrial loans.
2. By the purchase of gilt-edged securities, provided that these are sold either by another industrial company or by an investor who reinvests the proceeds in new industrial investments. (Only in the latter case does new money reach industry.)
3. By the purchase of a controlling interest in another industrial company, provided the shareholders in the company purchased reinvest the proceeds in new industrial issues.[2]

[1] During 1953 there has been evidence of a counter-managerial revolution by shareholders, led by certain ingenious financiers who conceived the complicated form of arbitrage known as the take-over bid.

[2] The result of such transactions is normally the transfer of assets from a less to a more profitable business. To the purchasing company the take-over is a cheaper way of acquiring assets than would be possible by purchasing them as individual items. The take-over therefore represents the transfer of assets from a static or moribund company to a growing *and also liquid* company. There is, however, no question of direct transfer from the liquid company to the growing company which is in need of cash.

Thus companies with surplus liquid funds do not greatly contribute to the financial needs of companies which are increasing their physical assets at a faster rate than they can finance out of their own resources.

Individual private investors and the Macmillan Gap

High taxation has perhaps done more to change the position of the individual private investor since 1931 than any other single influence. It has affected their investment capacity and investment behaviour. These questions have been endlessly discussed in this country without bringing very much concrete evidence to light.

A recent Harvard Inquiry amongst American investors does, however, provide evidence which, with qualifications, would seem to be of some relevance to British experience.[1] The effect of progressive taxation upon investment in industry would clearly depend on the extent to which the wealthy are a source of industrial finance. The Harvard Inquiry establishes that, in the United States, households with incomes of over $15,000 a year, which comprise 1 per cent. of the total numbers of the United States population, hold 65 per cent. of the total amount of privately held quoted equity. This group is still able to make 25 to 35 per cent. of the total amount of annual accumulations of investable funds by all private individuals, in spite of progressive taxation to a high marginal rate. The reason for the maintenance of their ability to save is that the U.S. tax structure permits legitimate relief from income tax to an extent which does not obtain in the British system. It is therefore likely that in this country the ownership of wealth is more widely spread than in the U.S., and that the proportion of total investable funds accumulated by the highest income groups is far smaller.

Turning to the influence of taxation on investment behaviour within the top 1 per cent. of incomes, the study shows that the majority of investors in this group are affected by taxation in their investment policies. The principal effect of taxation is apparently to reduce their interest in investing for income, and to increase their preoccupation *either* with maintaining their capital intact *or* with making it appreciate in value. It increases the caution of the conservative investor and the willingness to take risks of the venturesome investor. It is likely that investors in this country have reacted in the same way.

The effect of estate duties has been to promote the formation of trusts, which in turn have the effect of reducing the supply of risk capital, owing to legal requirements relating to trustee securities and to the normally cautious behaviour of trustees.

[1] *The Effects of Taxation: Investment by Individuals*, by J. K. Butters, L. E. Thompson, and L. L. Bollinger.

Taxation has increased the incentive to invest in family businesses and private ventures (owing to the lower taxation of retained profits, to the benefit of tax-free directorial expenses, &c.), but this effect may well have been compensated by its effect in reducing the investment capacity of investors. Both these influences are probably more strongly marked in England with the reduction of the capacity to invest outweighing the increased incentive to do so.

The general conclusion of this study, so far as our particular problem is concerned, was that taxation had slightly reduced the flow of risk capital in the form of investment in marketable securities and in private ventures and family businesses. It would be reasonable to assume that taxation has reduced the flow of risk capital in this country to a much greater extent, owing to its stronger effect in reducing investment capacity.[1]

The result of the developments so far mentioned may now be summed up. Cheaper credit and a proportionately greater interest in home as opposed to foreign investment have helped to increase since 1931 the supply of finance for domestic industry in general; the growth of institutional investment has provided on an unprecedented scale a market for unquoted issues in amounts as low as £150,000 and £200,000, and for industrial mortgages in amounts as low as £15,000 to £20,000. Taking into account the fall in the value of money since 1931, this represents a considerable improvement in the supply of finance by way of loan and preference share issues to the Macmillan Gap borrower. But the borrower without freehold security still finds great difficulty in obtaining long-term loans in amounts lower than £150,000–£200,000 from sources other than ICFC.[2] And there is a general lack of finance for investment in ordinary shares, which is particularly marked where it is required in relatively small amounts and where the shares are unquoted. This has to some extent been alleviated, but only in the case of the better class of private company, by the very recent development of an interest in unquoted equities by some institutions, which has been mentioned in a preceding section.[3]

[1] An important influence in reducing the investment capacity of British investors in private companies is the Estate Duty Legislation of 1940—Section 46 and 55 of the Finance Act, 1940.

[2] Industrial and Commercial Finance Corporation Ltd.

[3] Since 1931 there has also taken place an increase in the supply of finance for the hire-purchase of plant and machinery. This has in practice been of some assistance to the smaller business. I do not propose to deal with it in this article, for the following reasons: (i) the total amount provided is not large; (ii) it falls within the category of medium-term credit, which implies firstly that it is not particularly attractive to the British manufacturer, because he cannot amortize his plant sufficiently rapidly to meet the rate of repayment required, and secondly that it is outside the scope of discussion of the problem of the Macmillan Gap which is by definition that of the insufficiency of long-term and permanent capital.

The ICFC in the Macmillan Gap[1]

The ICFC was established in June 1945 by the English and Scottish banks and the Bank of England, which agreed to subscribe up to £15 million of share capital and to provide facilities for the corporation to borrow from themselves up to a further £30 million. The corporation's purpose was to provide long-term and permanent capital in amounts which would normally range between £5,000 and £200,000 for industrial and commercial businesses established in Great Britain, 'particularly in cases', so runs the wording of its Articles of Association, 'where the existing facilities provided by banking institutions and the Stock Exchanges are not readily or easily available'. The gap which it had to fill was, as we have seen, the lack of long-term finance in amounts up to £150,000–£200,000, on other than exclusively freehold security or without security of any kind, and in the form of unquoted securities or other financial paper without a ready market. The corporation's record shows that it has done a good deal to meet these needs. It has made a sufficient number of small loans to bring the average size of its investments to about £50,000. The greater proportion of its investments are unquoted; out of a total of over £26 million outstanding at 31 March 1953, little more than £2 million were quoted and these represented either new public issues which could not be sold through the normal channels at the time of issue or introductions and placings upon the Stock Exchange of securities in which the corporation had invested prior to their quotation. The extent to which the corporation has provided finance without security is shown in the table below.

Distribution of ICFC investments[2] at 31 March 1953

	Proportion of total investments
	%
Secured loans	41
Unsecured loans	22
Preference shares: redeemable	18
irredeemable	11
Ordinary shares	8
	100

[1] See *Long-term and Permanent Finance for Industry*, by Lord Piercy of Burford, a pamphlet published by the Corporation, the text of which is based on a lecture given by Lord Piercy to the Manchester and District Bankers' Institute, 19th March 1948.

[2] The category 'secured loans' should not be considered as equivalent to mortgages, for the freehold security in many cases is not adequate to cover the amount of the loan. All loans and the majority of preference shares are redeemable. The majority of the corporation's investments being unquoted, its portfolio would be entirely frozen if they were also irredeemable. Loans are generally redeemable by annual instalments, in order to maintain a continuously revolving fund, and also to introduce some element of liquidity from the start of operations in 1945; but for this the portfolio would have been frozen for the first 10 to

The amount and term of lending are determined by the degree of risk which the lender is willing to take, and finance for the Macmillan Gap is, by definition, the most risky kind there is. Securities issued by borrowers have no ready market, and must be held without hope of disposal when business is bad; and the borrowers are characteristically less credit-worthy than those with which the machinery of the City is accustomed to deal. They are, to start with, of a smaller average size, which implies that the management will be composed of fewer individuals, with a correspondingly smaller fund of experience and ability than is possessed by the management of the larger public companies. The smaller business is also too poor to purchase the best staff, ideas, and technique. Only by growing out of its class can it afford these things; and it can only grow by ferocious specialization on what it can do best—with the risks that this implies. Finally, the small business is generally under-capitalized and lacks adequate reserves, because, there being no ready source of finance for this class of business, it must begin with the savings of the individual proprietor and grow out of its own profits—which have also to support the relatively heavy burden of maintaining that individual proprietor. In theory, it should be possible to offer to meet the whole demand from this particularly risky field of industry—at a price. In practice this is not so, owing to the impossibility of either assessing the risk at all when it gets beyond a certain degree, or of coping with the problem of watching and administering an investment of exceptionally explosive potentialities. Consequently, the business of the lender is to select the applications which can be done on practicable terms and reject the remainder. The problem is where to draw the line. The ICFC has made its selection on the principle that its operations as a whole must not in the long run show a loss but on the contrary must yield some surplus for building up reserves. Since its revenue comes out of the profits of the companies in which it invests, and since default by borrowers could be the principal item affecting this revenue, the corporation tries to select those concerns which can be expected to earn sufficient profits to service an investment throughout its life. This principle also determines the amount and terms of what is offered. A given concern may be a reasonable investment for a certain amount and on certain terms. The test of profitability is not, however, applied in a rigid and uniform way. The corporation is expected to provide money in amounts as low as £5,000, but loans of less than £15,000 show no profit at all, on a strict allocation of expenses (because the costs of investigation, negotiation, and administration do not decrease as the size of the loan decreases), and on a correct provision

15 years. Preference shares are redeemable only at maturity, because an element of permanence is one of the essential qualities of share capital. The duration of loans varies between 10 and 25 years; of redeemable shares, between 15 and 30 years. The proportion of ordinary shares is relatively small, for reasons which will be dealt with below.

for risk of capital loss (because the small loans are generally more risky than the large). Furthermore, in order to encourage new developments within its field the corporation undertakes certain investments where the risk is impossible to assess with the accuracy required for a strictly commercial investment, on terms which do not offer a reward corresponding to the risk even if the venture is successful.

It is apparent that the degree of risk which the corporation can undertake depends on its ability to make profits and this is not entirely within its own control. The rate on its borrowings from shareholders is linked to bank rate, which is variable, whereas the rates on the corporation's loans already outstanding are fixed.[1] Furthermore, when bank rate goes up the corporation cannot always pass on the increase in the rates on investments under negotiation, for long rates do not necessarily follow the full extent of a change in the bank rate. The importance of this factor may be appreciated from the fact that out of a gross income of £1,500,000 in 1953, the corporation had to pay in interest charges during the year an additional £200,000 following the change in bank rate in 1952. The corporation's ability to make profits is also limited by the upper limit of its lending. As we have seen, it already subsidizes the small borrower out of the proceeds of its larger, safer, and more profitable loans. If it were permitted to compete for a certain amount of City business outside the Macmillan Gap, it would be in a better position to take risks within the Gap itself.

The general degree of risk in the financing of small business is such that a loan may carry a risk of loss equivalent to that on a good-class quoted ordinary share. It is consequently inappropriate to assess the corporation's provision of risk capital by the proportion of its investments in ordinary shares. Furthermore, it is extremely difficult to invest in unquoted equity at all: shareholders in private companies are generally reluctant to part with any of their interest in the business for which they have a highly personal kind of proprietary sentiment. If they are willing to do so at all, their notions of price are frequently higher than what a dispassionate outsider is prepared to pay, and with an unquoted security there is no possibility of recourse to the independent yardstick of the market price. It would appear that only death can normally compel a shareholder in a private company to come to terms; the difficulties experienced by the corporation in providing equity finance for development do not affect to the same degree the Estate Duties Investment Trust Ltd., the corporation's

[1] In Sept. 1951, just before bank rate was first increased, the average rate of return on the corporation's fixed interest investments of £19·9 million amounted to 4·84 per cent. By Sept. 1953, after a considerable increase in bank rate and in the rate on its own borrowings, the average rate on its fixed interest investments, amounting to £24·4 million, had risen by only 0·32 per cent. (to 5·16 per cent.). This shows the very small extent to which the corporation can pass on an increase in its own interest charges.

associated company, which purchases existing equity from shareholders to enable them to provide for payment of death duties.[1, 2]

Conclusion

It is likely that there is now a reasonably adequate supply of finance by way of loans and preference shares to the smaller industrial borrower. The problem that remains to be solved is the lack of equity finance. Such market as now exists is likely to become glutted by the sales of existing equity by shareholders in established private or small public companies, who have to make provision for paying estate duties. Such equity will normally be a more attractive investment than issues for cash by new and potentially growing companies which lack a long history of profitable trading and a strong balance-sheet position. It may be that the techniques of investing institutions, particularly ICFC, will develop to cope with this problem; that ways will be found of dealing with the managerial responsibilities involved. But the individual private investor remains an indispensable source of finance in the Macmillan Gap, particularly for the newer and smaller propositions. If the effect of taxation is likely to reduce the number and investment capacity of individuals who are willing to lock up their money in such industrial ventures, the most economic use should be made of those who remain. The market for this kind of capital is very imperfect, and there is a case for centralizing and organizing it so as to bring to this field of industrial finance at least some of the benefits which organization has brought to the market for capital in larger amounts.

[1] See above, p. 193.

[2] The corporation has one other associated company, the Ship Mortgage Finance Co. Ltd., which provides medium-term credit to ship-owners on the security of ships. The corporation has a minority interest in both associated companies, one purpose of the device being to share the risk of a highly specialized field of investment between the corporation and a number of other institutional shareholders.

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